

Wisconsin Water Quality Assessment Report to Congress 2004

Wisconsin Department of Natural Resources
Water Division

PUB WT-798 2004

Acknowledgements

This report was prepared through the coordinated efforts of many people who provided extensive information and assistance.

Primary Author/Editor

Lisa Helmuth

Major Contributors in 2004

Corinne Billings, Laura Bub, Laura Chern, Sue Joseff, James Killian, Nancy Larson, Michael A. Miller, Vic Pappas, Pat Trochlell, Duane Schuettpeltz, Susan Sylvester

Additional Contributing Authors and Organizations

Tim Asplund, Tom Bauman, Keri Behm, Gretchen Benjamin, Heath Benike, Tom Bernthal, Elizabeth Bier, Marty Burkholder, Jim Baumann, Al Byla, Marsha Burzynski, Matthew Catalano, Ryan Campbell, Randy Case, Erin Crain, Terry Cummings, Terry Dukerschein, Ed Emmons, Jennifer Filbert, Kari Fleming, Meg Galloway, Tom Gilbert, Toni Glymph, Dave Heath, Jeff Helmuth, Laura Herman, Greg Hill, William Jaegar, Steve Jaeger, Greg Kester, Doug Knauer, Jeff Kreider, Jim Kreitlow, Charles Ledin, Lee Liebenstein, Al Lulloff, Ron Martin, Bob Martini, Bob Masnado, Mike Miller, James A. Morton, Tom Mugan, Nancy Nate, John E. Nelson, John Panuska, Jennifer Pelczar, Shaili Pfeiffer, Janel Pike, Bob Ramharter, Russ Rassmussen, Marty Ringquist, Eric Rortvedt, Jim Ruppel, Carroll Schaal, Karl Scheidegger, Candy Schrank, Ken Schreiber, Greg Searle, Pat Sheahan, Dave Siebert, Tim Simonson, Kris Stepenuck, John Sullivan, Linda Talbot, Mike Talbot, Mary Rose Teves, James Vennie, Mary Ellen Vollbrecht, Carmen Wagner, Kim Walz, Li Wang, Robert J. Waschbusch (USGS), Dreux Watermolen, Richard Wedepohl, Mike Wenholtz, Susan Zech.

Design/Layout

Lisa Helmuth

Adapted from the 2002 Water Quality Assessment Report to Congress,
Design/Layout by Georgine Price



Introduction

Wisconsin, rich with a broad array of cultural and natural resources, is known nationally for its exceptional water features. During the past two years, our state has made significant gains in the area of watershed management and protection. Governor Doyle's successful water initiatives include the passage of landmark legislation to protect both groundwater and sensitive surface water features from excessive consumptive uses; recognition of our significant Great Lakes through special management efforts to restore and protect this globally renowned resource; ramping up monitoring and educational outreach to stem the influx of aquatic nuisance species into our precious waterways; developing a special office to provide comprehensive environmental analyses of large-scale energy proposals in the state; and a steadfast commitment to fully implement the Clean Water Act while maximizing the efficiency of permitting processes.

This 2002-04 Water Quality Assessment Report describes our state's special resources and the programs and projects that help protect them. The work described reflects the DNR's commitment to four key goals: implementing the Clean Water Act, preserving the public trust doctrine, maintaining healthy fisheries, and protecting our groundwater for future generations. The hows, whys and results of our efforts to achieve these goals are described, and specific public and private activities to improve, protect and better understand our aquatic treasures are highlighted.



July 2004

Subject: 2004 Water Quality Assessment Report to Congress

Citizens of Wisconsin:

Enclosed please find a copy of our biannual report to Congress detailing the status of Wisconsin's waters. This report satisfies Federal Clean Water Act requirements and provides a compendium of information on the status of our waters for you, the citizens of Wisconsin. This report describes how WDNR is working to meet four key goals related to water: implementing the Clean Water Act, preserving the public trust doctrine, maintaining healthy fisheries, and protecting our groundwater for future generations. We have included program descriptions and contact information, as well as recommendations to USEPA and Congress on how the federal government can help our state better carry out the responsibility of implementing the Clean Water Act. It is our goal to do everything we can to attain waters that fully support fish and aquatic life, recreation, and drinking water designated uses, as well as to ensure that the fish you eat is safe and free of contaminants.

This report includes statewide water quality assessment data for lakes, rivers and Great Lakes shoreline miles (2002), as well as updated total Great Lakes shoreline and stream miles and lake acres calculated using the most current technology available. From this analysis, it is clear that great progress has been made in restoring the integrity of our waters. Point sources have been and continue to be managed and significant progress has been made in developing a framework to improve management of nonpoint sources. In addition, significant policy initiatives designed to better protect groundwater and sensitive surface waters, such as outstanding resource waters, and to better address the special needs of the Great Lakes Ecosystem have been sponsored by the Governor. The new groundwater legislation will protect sensitive resources from excessive consumptive use, while a new Great Lakes Office will focus resources on one of our most beloved ecological treasures.

Despite this progress, however, problems continue to limit the use of surface water and groundwater and consumption of fish and other related aquatic life. Contaminated sediment, atmospheric deposition of pollutants, habitat destruction, and the continued influx of aquatic exotics all pose significant threats to our waters. Some land management activities or poorly planned development also negatively affect surface water and groundwater quality and quantity.

Today's water management issues are complex and cannot be addressed by any single entity acting alone. Whether the goal is to reduce phosphorus or mercury, protect critical habitat or prevent introduction of exotics, we need strategies designed by and for coalitions of partners — government, industry, advocacy interests and individual citizens. For success, these efforts need to be coordinated and integrated using a hydrologic and culturally inclusive orientation: the Watershed Approach.

Please use this report to help determine the status of waters that interest you. By familiarizing yourself with existing conditions and problems, you can help identify and carry out solutions. We *can* resolve remaining problems and prevent additional concerns by working together. Through sharing common goals for our watersheds, we can restore and protect the unique water wealth that largely defines the State of Wisconsin. For more information about this report, please contact Lisa Helmuth at 608-266-7768. I encourage you to participate in watershed management efforts in your area; everyone's involvement is needed to successfully protect and manage our state's water heritage.

Sincerely,

P. Scott Hassett, Secretary

Table of Contents

Acknowledgements	2
Introduction	3
Recommendations	7
Part I: Report Summary	8
Part II: Background	9
Atlas Data	9
Figure 1. Map of basins, counties, water management units	9
Figure 2. Lake assessments entered into WADRS	10
Figure 3. Stream assessments entered into WADRS	10
Protecting Our Water Heritage	10
Science and Innovation in Water Management	11
Watershed Studies	11
Monitoring & Management Studies	12
Water Management Programs	14
Water Quality Management Planning	14
Figure 4. Landscape Ecosystems	14
Figure 5. Principle Issues Identified through Basin Planning	15
Water Quality Standards	16
Table 1. ORW/ERW Waterbodies	17
Wastewater Management	19
Table 2. Wisconsin WPDES Permit Backlogs as of January 1, 2004	20
Table 3. Significant WPDES Violations	21
Figure 6. Disposition of Sludge Waste-Municipals	21
Figure 7. DCOMM/DNR Wastewater Regulation Jurisdictional Boundary	24
Management of Polluted Runoff	26
Table 4. Targeted Runoff Management and Stormwater Grant Program	28
Figure 8. Priority Watershed Projects	31
Dam Management	31
Contaminated Sediment Management Program	33
Impaired Waters Program	34
Cost Benefit Assessment	36
Environmental Improvement Fund	36
Land Acquisitions and Easements	37
Polluted Runoff Management Program	38
Special State Concerns and Recommendations	39
Part III: Water Resource Assessments	46
Chapter 1: Surface Water Monitoring Program	46
Baseline Monitoring	46
Figure 9. Baseline Monitoring Sites and 303(d) Waters	48
Figure 10. Summer Secchi Depth	50
Figure 11. Total Phosphorus	51
Figure 12. Northern Pike Relative Abundance	51
Pathogens	51
Fixed Station/Long Term Trend Monitoring	52
Sediment Monitoring	52
Special Studies Monitoring	52
Fish Tissue Monitoring	52
Figure 13. 2003 USGS Gage Stations	53
Table 5. Wisconsin's Fish Contaminant Monitoring Summary 2002-03	54
Volunteer Monitoring	55
Figure 14. WAV Database	55
Water Quality Modeling	56
Laboratory Analytical Support	57
Data Storage, Management and Sharing	58
Chapter 2: Assessment Methodology & Summary Data	62
Waterbody Assessment Display and Reporting System (WADRS)	62
Figure 15. WADRS Homepage	62
Figure 16. Assessment Unit	63
Impaired Waters Screening Criteria	64

Chapter 3: Rivers and Streams	64
Assessment Summary	64
River Management	65
Highlighted Projects	66
Dam Removals	67
Figure 17: Prairie Creek System	69
Big River Management (Mississippi River)	71
Figure 18. Pool 8, Emergent Vegetation After Drawdown (2001)	71
Figure 19. Long-Term Resource Monitoring, Pools 4 and 8	72
Figure 20. Average Zebra Mussel Veliger Concentrations	73
Contaminated Sediment Management	74
Figure 21. Jordan, Pine and Hayton Millpond System	75
Figure 22. Kewaunee Marsh Site	76
Figure 23. Slaughterhouse Creek Site	76
Figure 24. Newton Creek, Hog Island Inlet	77
Chapter 4: Inland Lakes	78
Lake Planning and Management	78
Figure 25. Status of County Shoreland Management Initiatives	78
Lakes Assessment	80
Table 6. Trophic State of Lakes (1997-2001)	81
Table 7. Trends in Significant Public Lakes	81
Figure 26. Self-Help Database	81
Table 8. Volunteer Monitors in Wisconsin	82
Figure 27. Long-Term Trend Study Lakes	83
Chapter 5: Great Lakes	84
Assessment Summary	85
Great Lakes Ecosystem Restoration	85
Figure 28. Priority Watersheds in the Coastal Zone	88
Lake Michigan Lakewide Area Management Plan (LaMP)	89
Lake Superior LaMP and BiNational Program	89
Table 9. Pesticides Collected in Lake Superior (WI)	91
Remedial Action Plans for Water Quality Restoration	94
Figure 29. RAP Sites in Wisconsin	94
Figure 30. Lower Fox River AOC	95
Figure 31. Sheboygan AOC	96
Figure 32. Duluth/Lake Superior AOC	99
Exotic Species	99
Chapter 6: Wetlands	100
"Reversing the Loss" – the Wetland Strategy	100
Chapter 7: Public Health/Aquatic Life Concerns	106
Water Quality Assessments - Toxic Substances	106
Table 10. Total Size of All Waterbodies Affected by Toxicants	106
Aquatic Life Toxicity Testing	106
Table 11. Summary Of SLH Toxicity Test Results For 2002-03	107
Table 12. Whole Effluent Toxicity Tests	108
Fish Tissue and Monitoring Program	108
Table 13. Wisconsin's Fish Contaminant Monitoring and Cumulative Advisories	109
Table 14. Wisconsin Fish Consumption Advisory Guidelines	110
Sites of known sediment contamination	111
Table 36. Sites of Known Sediment Contamination	111
Restrictions on bathing areas	112
Source Water Assessment Program	114
Figure 33. Source Water Protection Areas	114
Chapter 8: Ground Water	115
Wisconsin Groundwater Monitoring Program	118
Future Groundwater Protection	119

Recommendations

Many of Wisconsin's recommendations to USEPA and to the Congress can be addressed through a reauthorization of the Clean Water Act. These needs include national leadership on criteria, program guidance and funding commensurate with the range of activities required to fully implement the Clean Water Act. *Wisconsin recommends the following actions to Congress, USEPA and the Coast Guard:*



Finalize national nutrient criteria guidance for surface waters.



Establish a schedule for the completion of national sediment quality criteria guidance.



Reauthorize the Beach Act and implement program improvements identified during the first five years of program implementation.



Establish a more clearly defined and achievable program to develop and implement TMDLs, including developing national criteria for designating and delisting 303d impaired waters and leading multi-state efforts for regional issues, such as mercury TMDLs and listings.



Develop clear regulations for discharges from sanitary sewer overflows.



Regulate atmospheric mercury to levels that are protective of fish and aquatic life.



Fund monitoring programs and require states to use the same criteria for biological assessment protocols. Provide fiscal support to states to improve the useability of STORET.



EPA should develop a sediment remediation program which includes specific standards or quality criteria, timelines for implementation and a funding system to provide assistance to states for building state capacity and conducting remedial projects for sites identified in remedial action plans and lakewide management plans as a means of reducing toxicant body burdens in Great Lakes fish and wildlife.



Develop guidance that requires integration of water program standards and regulation of substances through the Toxic Substances Control Act (TSCA); the Resource Conservation and Recovery Act (RCRA); the Clean Air Act and the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA).



Address discrepancies between regulatory clean up levels for PCBs under Superfund and clean up levels needed for water quality and aquatic life.



Develop and enforce controls under the Federal Insecticide, Fungicide, Rodenticide Act for compounds found to be problematic for groundwater quality to a level protective of groundwater.



Increase funding for Clean Water Act Section 106, 319, 104b(3) and 205(j) or local 604(b) related water quality efforts without sacrificing funding from other programs.



Develop technical guidance and resources to support decisions related to wetland and riparian zone protection and management, particularly buffers for sensitive areas vulnerable to runoff.



Modernize and simplify the permit compliance system (PCS) system for the NPDES program or implement other information systems or reporting mechanisms needed for the program.



Congress should develop a continuing appropriation for USEPA and delegated states to support data systems needed to implement the Clean Water Act including monitoring, assessment, and permitting activities using new technologies that integrate complex data and allow dissemination of that data to partners, stakeholders and the public.

Part I: Report Summary



In 2002-04, Wisconsin progressed in its development of a comprehensive framework to reduce and manage nonpoint sources of pollution through statewide performance standards for this, the largest source of conventional pollutants to our waters. In addition, significant policy initiatives designed to better protect groundwater and sensitive surface waters, such as outstanding resource waters, and to better address the special needs of the Great Lakes ecosystem have been sponsored by the Governor. New groundwater legislation will help protect sensitive resources from excessive consumptive use, while renewed emphasis on the Great Lakes will focus talent and resources on this, one of our most-beloved ecological treasures.

Additionally, Wisconsin is improving its tracking of water quality condition through data management system upgrades for assessment, permitting and compliance. We are also implementing electronic discharge monitoring report submittals and web-based permit applications. These changes take advantage of new technology, making data more available to decision makers and the public. Enhancements incorporate spatial views, or maps, so that waterbodies and descriptive data can be viewed and edited interactively. This technology makes data available for integrated analyses and for “point-and-click” readability at the waterbody level to improve management and public access.

Using new tools that improve the accuracy of waterbody size calculations, we have found a significant difference in the total mileage historically reported for 305b purposes. The state’s 1:24 hydrography layer shows that our state supports 84,474 stream miles, 1.2 million lake acres and 1,000 Great Lakes shoreline miles. In 2005-06, assessment data will better match these summary figures (ie., the 1:24,000 scale hydrography layer will be used to calculate individual waterbody size), thereby changing our state’s assessment calculations. However, in this report we are resubmitting 2002 assessment figures, described below.

As of the 2002 reporting period, 24,422 stream miles (28% of total based on 84,474 mi) were “assessed” — 9,199 miles had been monitored (11%) and 15,222 miles were evaluated (18%) — all 57,698 stream miles are listed as impaired for one or more beneficial uses due to a statewide general fish consumption advisory for mercury. These data reflect cumulative work over a period of several years. In addition, direct habitat alterations negatively affect 8,459 stream miles; siltation or sedimentation affect 6,458 stream miles; and nutrients affect 2,717 stream miles. Following these key causes are turbid waters, low dissolved oxygen and the presence of pathogens (bacteria).

Sources of problems include atmospheric deposition (57,698 miles), agriculture (5,620 miles), hydrologic modifications (4,223 miles), non-hydrologic habitat modifications (3,583 miles), and streambank pasturing (2,736 miles). These stream figures reflect historic data (gathered prior to 2000-02) as well as assessments made in 2002.

Wisconsin lakes have been more comprehensively evaluated than streams, in large part due to outstanding Lake Monitoring Volunteers. Over 792,000 lake acres have been assessed, with 758,782 acres monitored and 33,519 acres evaluated. As with rivers, due to the presence of a general fish consumption advisory for mercury, all 792,000 lake acres are listed as impaired for one or more designated uses, with mercury via atmospheric deposition the chief cause/ stressor. Other problems include excess nutrients, siltation, organic enrichment, noxious aquatic plants, and the presence of aquatic invasive species. Key source categories include agriculture, construction, hydrologic modifications (dam construction and flow changes), and habitat modification or destruction.

Wisconsin plans to achieve comprehensive coverage of its waters through continuing to implement baseline monitoring utilizing random stratified sampling techniques and improve the tracking and assessment of all waterbodies. In addition, the state’s growing Volunteer Rivers Program will help provide “red flag” data to biologists, which will help focus valuable resources. These improvements, combined with substantial improvements in data management systems, will allow Wisconsin to better understand and communicate general trends or changes in water quality over time.

Issues of special concern include nonpoint source standards implementation, Great Lakes management, aquatic invasive species, water quantity, riparian development, habitat protection and restoration, atmospheric deposition of mercury, monitoring and data management, and compliance assistance.



Part II: Background

Atlas Data

Wisconsin is a state rich in water resources. There are many thousands of streams in the state covering 41,614 perennial river miles and 42,860 miles of intermittent streams for a total of 84,474 linear stream miles. The state's many inland lakes span over 1.2 million acres. Wisconsin also has over 1,000 miles of Great Lakes shoreline on lakes Michigan and Superior, 5.3 million acres of wetlands and, with a few exceptions, a largely abundant supply of groundwater.

The task of assessing, monitoring and managing these water resources is large, and quite frequently, available data for many of the resources is outdated or non-existent. As Figure 1 below shows, Wisconsin subdivides the state by basins for the purpose of managing water resources. Management basins are a mixture of hydrologic basins at the 8-digit HUC level, county boundaries, and DNR regional boundaries. Figure 2 shows that lake assessments have been completed and entered into the state's Waterbody Assessment Display and Reporting System (WADRS), our assessment database, for all management basins. Figure 3 shows that all of the management basins have been assessed for aquatic life use and fish consumption advisories, yet stream assessments for only a portion of the management basins have been entered into the WADRS database. The results of these assessments are discussed in Chapters 3 and 4.

Figure 1. Map of basins, counties, water management units

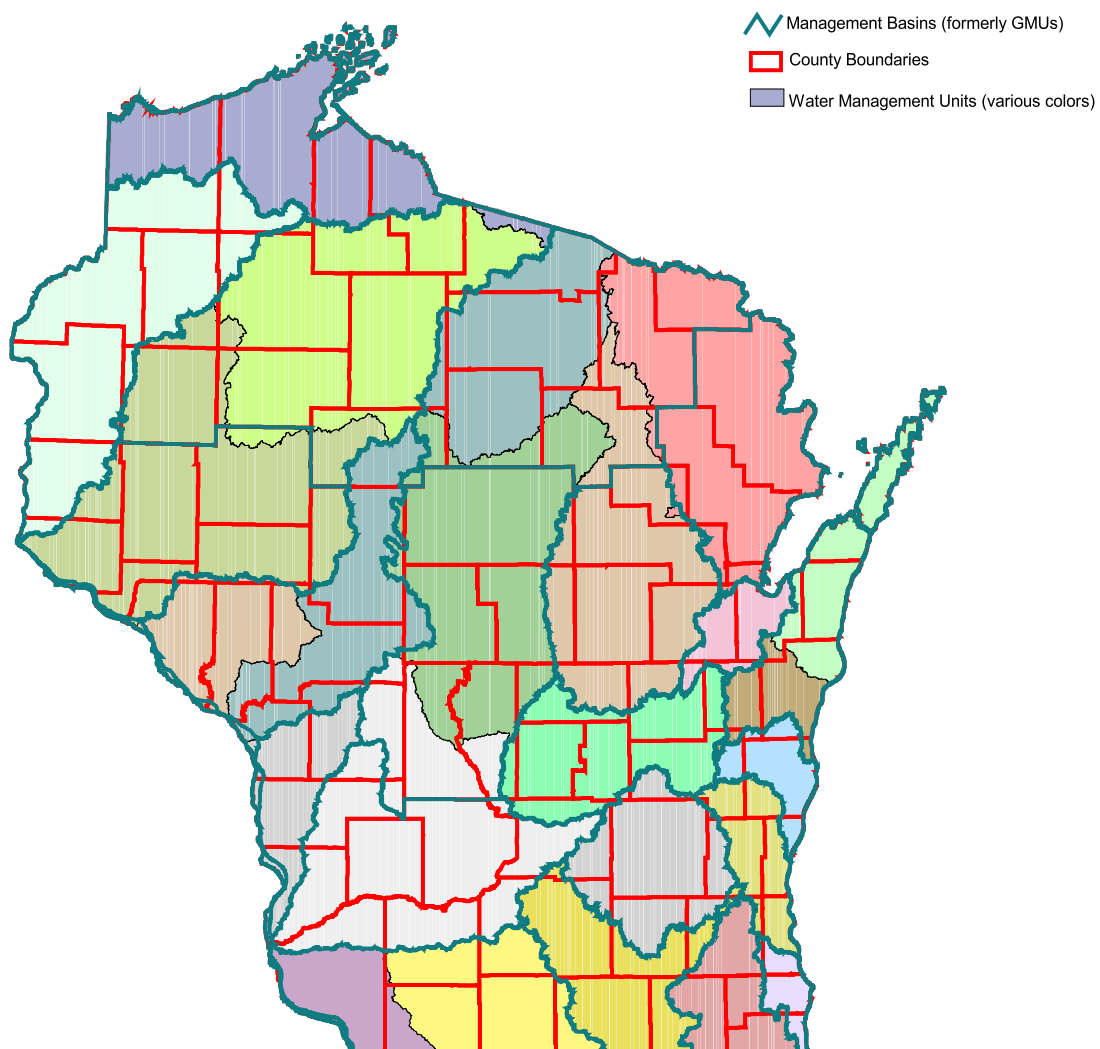
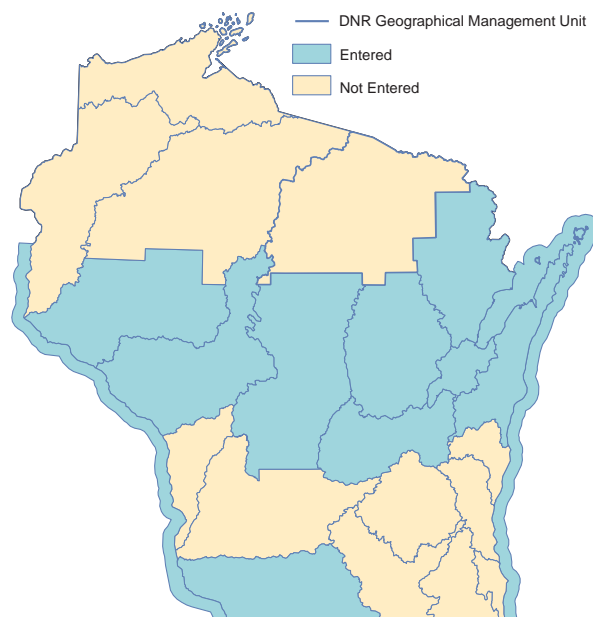


Figure 2. Lake assessments entered in database



Figure 3. Stream assessments entered in the database



Protecting Our Water Heritage

Achieving the Department's goals of ecosystem protection and public health and safety involve key objectives that center on water, namely protecting the state's public trust doctrine and fully implementing the Clean Water Act. These critical areas are inter-related and both require using a Watershed Approach.

Wisconsin's Watershed Approach is an evolving framework, infusing traditional management tools (standards, regulations) with fresh ideas borne of cutting edge technology and visionary thinking. Wisconsin integrates its water programs through place-based management, using the basin as the focus of program implementation for many aspects of Clean Water Act implementation.

The Department is evolving its management programs to better integrate such diverse resource areas as water quality and quantity, surface water and groundwater, fisheries, habitat, wildlife, and forestry. Connections between water quality and resource sensitivity are being made through environmental corridor protection, shoreland management programs, and special studies that identify sensitive areas critical to pollution. Land management initiatives such as Wisconsin's Land Legacy and Ecological Landscapes (Figure 4) identify special resource areas with an eye toward aquatic sensitivity.

The Watershed Approach includes using adaptive management to continually review and adapt programs and structures to remove impediments to integration and to utilize incentive-based resource management practices where possible. The Division of Water is re-evaluating all aspects of structural and functional program implementation to better achieve the goals of clean water and protected resources for future generations. Further, the Department will continue to work with stakeholders, partners and in-place interstate initiatives to achieve these goals.

To protect and enhance our natural resources:

our air, land and water;

our wildlife, fish and forests

***& the ecosystems
that sustain all life.***

Science and Innovation in Water Management

During 2002 and 2003, the Wisconsin DNR participated in a number of research projects to enhance knowledge of watershed and contaminant transport processes, with the ultimate goal of refining and improving resource management and ecosystem health. Below are a few of these projects.

Watershed Studies

Development and Evaluation of Watershed Models for Predicting Potential Stream Condition and Making Land Use Decisions

The goal of this study is to develop and test models that quantify stream biological expectation and to predict how watershed land uses will influence the realization of this expectation. The approach used is to develop models that predict stream segment temperature, flow, and biological conditions based on climate, surficial geology, topography, soil, vegetation, and land uses for various regions of Wisconsin. These models are then linked to classify and map Wisconsin stream segments to explore how projected land-use changes may affect stream conditions for selected watersheds. Collection of field physical and biological data and developing GIS layers for watershed characteristics for this study is complete, and the data modeling process has begun.

These models can be used to classify stream reaches that lack adequate fish data and to estimate how watershed land-use has influenced thermal regimes, flow patterns, and fish communities across broad regions. Fisheries managers will be able to compare the expectations for a specific watershed with its current condition to determine its potential for improvement and to establish more realistic fishery goals. Planners can use these models to predict biological conditions under different landuse scenarios. Based on the stream classification, sampling and inventory efforts can be better allocated among watersheds and streams to maximize efficiency and statistical reliability for bioassessment.

Evaluation of the Wisconsin Priority Watershed Program for Improving Stream Habitat and Fish Communities

This project was designed to determine the extent to which installation of best management practices (BMPs) improves the quality of aquatic resources. The study design is to sample habitat and fish communities using standardized procedures with known accuracy and precision at treatment and reference streams several years before and several years after BMP installation. And, two physical habitat (one for low and one for medium-high gradient) and two fish biological indices (one for coldwater and one for warmwater) have also been developed and tested. Fish and habitat data from 81 sites on 33 streams for five priority watersheds and their reference watersheds during the past 14 years have been stored in a centralized database.

The evaluation of the Spring Creek Watershed, which demonstrated significant habitat and fish community improvements after BMP implementation, is complete and has been published. The evaluation of the Otter Creek watershed is also complete and in the publication process, but results were less than expected. Habitat conditions improved in Otter Creek, but fish communities did not. A likely reason the fish community did not change much is because the fish community was pretty good prior to the project and implementation of BMPs that would most directly influence the fish community (upland sediment control, riparian protection) were not implemented at a level high enough to elicit a response in the fish community.

Impacts of Watershed Urban Land Use on Coldwater Streams

This study was designed to develop models that describe relations between watershed urban land use and biological communities and to answer the question "at what level of watershed urban

development can a coldwater stream no longer support trout populations?" Thirty-nine (39) coldwater streams with different levels of watershed urban development for physical habitat, water temperature, base flow, fish, and macroinvertebrate were sampled. Urban land use in both riparian and watershed were digitized using GIS. This study is complete and published. *Results indicate that stream base flow and biological indices decrease dramatically for watersheds with 7-11% impervious area, beyond which stream base flow is consistently low and biological indices are consistently poor.* Trout were not found in streams with more than 11% impervious surface area.

The models developed from this study can be used to predict stream quality for projected urban development, which can be used by policymakers, resource managers, planners, and developers to design strategies to minimize the impacts of urban development on coldwater streams.

Monitoring & Management Studies

Impacts of Phosphorus and Nitrogen Concentrations on the Biological Integrity of Wisconsin Stream

The objective of this project is to determine what phosphorus and nitrogen concentrations impair stream biological integrity; to develop a database that can be used to refine the phosphorus criteria for Wisconsin streams; and to determine how watershed characteristics affect the relation between phosphorus, nitrogen, and biological communities. DNR has gathered data for nitrogen, phosphorus, other physical and chemical variables, periphyton, macroinvertebrate, fish, and physical habitat from 160 headwater streams, 80 larger but wadeable streams, and 40 nonwadeable streams/ rivers. DNR gathered watershed land use and identified periphyton and macroinvertebrate community composition. Staff are now in the process of analyzing the data and the results will be available during this next reporting period.

The results of this study will be used to help interpret TMDL data and to refine nutrient criteria.

Status Assessment and Development of a Fish Index of Biotic Integrity (IBI) for Small Warmwater Streams

The objectives of this study are to evaluate fish and habitat status and to develop a fish IBI for very small and intermittent warmwater Wisconsin streams. Ninety-eight (98) small warmwater streams throughout the state with different levels of impairment (from least to highly impacted) have been sampled for fish and habitat twice a year for two years. Watershed boundaries have been delineated and land use information for these stream catchments has been gathered.

The results from this study will provide information on fish and habitat conditions for these small warmwater streams, which is currently unknown. The IBI developed here will provide a tool for setting regulatory criteria and bioassessment for these types of streams.

Comparison of Multi-level BMPs for Improving Stream Quality

This study is designed to evaluate if current levels of BMP installation improve stream habitat, fish, and macroinvertebrates and to examine if riparian buffer width has any influence on the upland BMPs effectiveness. Thirty-eight (38) small watershed streams with different levels of agricultural impairment and with different levels of BMP implementation (high impact - high BMP; high impact - low BMP; low impact - high BMP; low impact - low BMP) have been sampled. And, field data collection on fish, macroinvertebrate, and physical habitat is also complete. Riparian and watershed land use data has been gathered and watershed BMP implementation information is being assembled.

The results from this study can help researchers and managers understand if large-scale, low-level BMP implementation will improve stream quality. With this knowledge, resources can then be allocated more effectively.

Development of a Probability-Based Stream Monitoring and Assessment Strategy

The purpose of this study is to find a cost-effective approach for better understanding the state's resource condition. This work will help stem the loss of stream resources and help improve under-

standing of factors impacting water so that the state can more effectively monitor, assess and manage resources. The resulting information will be used to guide and evaluate stream resource assessment and management activities, and educate the public and political policy makers. This collaborative project is designed to: 1) determine whether three different methods used to select stream assessment sites significantly influence field data gathered to evaluate the condition of individual and populations of streams; 2) investigate how large-scale catchment attributes affect riparian and in-stream habitat and water chemistry, which in turn influence the biological integrity of streams; and 3) pilot the development of a multi-metric macroinvertebrate index for wadable streams in the driftless region ecoregion in western Wisconsin, and subsequently apply this process to develop a macroinvertebrate index for the entire state. The results of this study will be used to improve WDNR wadable stream monitoring and assessment program and advance and institutionalize the use of probability based monitoring in Wisconsin.

To learn more go to:

<http://dnr.wi.gov/org/es/science/>

Development and Validation of a Macroinvertebrate-Based Index of Biotic Integrity (IBI) for Low-Gradient Streams

Biotic assemblages in low-gradient streams are inherently different from those assemblages inhabiting medium to high gradient streams. Assessment tools developed through empirical modeling of data collected from medium to high gradient streams inaccurately score the ecological integrity of low-gradient systems. Therefore, we propose to tailor a macroinvertebrate-based IBI to low-gradient streams. Fifty-nine (59) sites will be used to develop the index and twenty-two (22) sites were set aside for validation. Watershed, reach, and local scale variables will be used to determine environmental conditions at the sites independently of the biota. Macroinvertebrate metrics that correspond with the independent assessment of environmental condition will comprise the IBI. The macroinvertebrate-based IBI tailored for low-gradient streams is intended for use in Wisconsin's Baseline Monitoring Program.



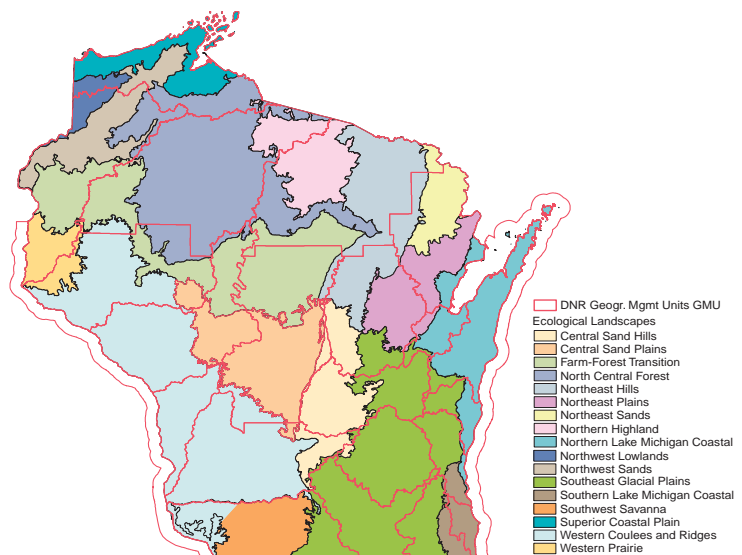
Water Management Programs

Water Quality Management Planning

Wisconsin's Water Quality Management Planning Program encompasses a broad array of activities, as 'basin plans' have historically served as the foundation for conformance reviews during implementation of many of the state's water-related programs, grants and permits. Water Quality Planning includes the following activities:

- Preparation of Basin or Integrated Management Plans.
- Assessment of rivers, streams, lakes and groundwater; entering data into the Waterbody Assessment Display and Reporting System (WADRS).
- Identification of areas for monitoring and management including identification of goals, objectives and projects.
- Ranking nonpoint source priority areas for streams, lakes or groundwater.
- Recommendations for specific Lake or River Planning or Protection Grants.
- Recommendations for prioritizing waterbodies for total maximum daily load (TMDL) implementation.
- Administration of the Local Water Quality Aid Program, which provides grant funds to local and regional governments for water quality management planning.
- Preparation of Sewer Service Area Plans.
- Oversight, review and approval of plans developed by designated planning agencies (Southeast Regional Planning Commission, Dane County Regional Planning Commission) and for additional designated management areas (Fox Valley Area, including Brown County and portions of East Central Regional Planning Area).
- Oversight, review and approval of sewer service area plans developed by communities with populations of greater than 10,000 – these undesignated planning areas.

Figure 4: Landscape Ecosystems



Integrated Basin Plans

The State's 32 major rivers fall into 23 management basins. During 2000-2001, 19 of these management basins developed State of the Basin Reports through an integrated planning process with partners. This multi-step process involved external partners in the identification and prioritization of issues and to help identify goals and objectives for ecosystem management. Integrated Basin Plans (or "State of the Basin Reports") can:

- ✓ Highlight priorities identified through a partner group process.
- ✓ Provide a descriptive summary of the physical and biological characteristics of the basin;
- ✓ Identify basin-specific water, fishery, wildlife and habitat issues. and
- ✓ Identify basin-specific objectives (in the form of recommended actions) linked to the GMU or

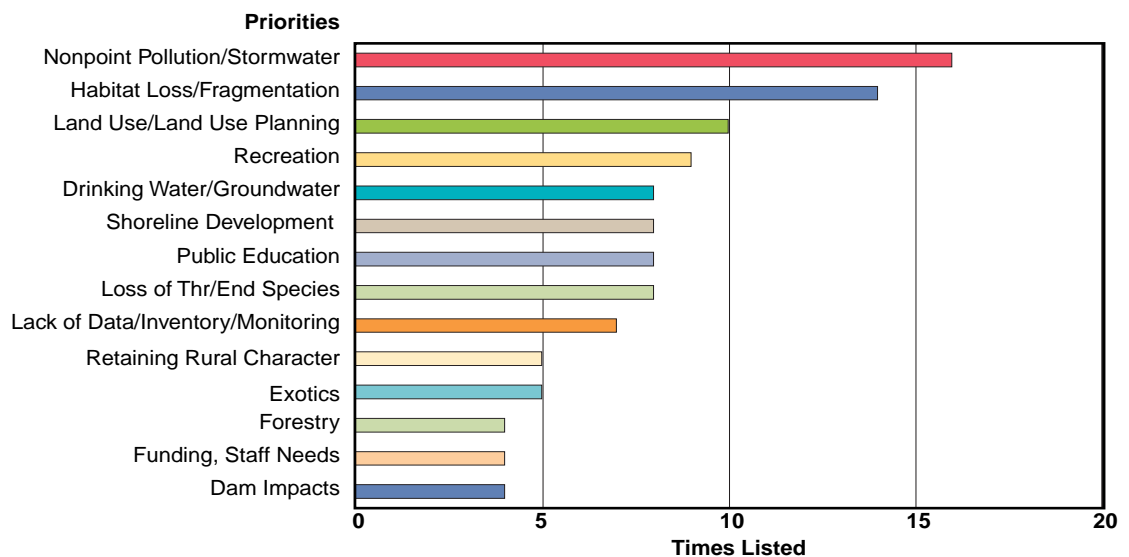
basin-specific issues.

Planning Status

The state's traditional planning schedule, updates on a five-year rotating basis, was replaced with a six-year schedule to support the structure of the basin-partner management approach. Through the identification of key issues, goals, objectives and recommendations, the plans provide a starting point for project identification and work coordination. This statewide schedule also coincides with DNR's internal biennial workplanning schedule and fisheries management planning approach.

The broadened scope of basin planning reflects a broadening of the state's key management issues as they relate to water. Priority issues identified in the plans are arrayed and compiled to identify the overall priorities identified at the basin level. Figure 5 shows the principle issues identified through the integrated planning process. These issues include habitat loss/land use conflicts, deterioration and fragmentation; nonpoint source pollution of surface waters; groundwater deterioration; contaminated sediments; user conflicts due to heavy recreational uses; contaminated sediments.

Figure 5: Principle Issues Identified Through Basin Planning



WDNR continues to make progress toward increasing the number of surface waters assessed for their water quality condition. This effort will be enhanced in the next year through an analysis of assessment protocols for streams, lakes and the Great Lakes and how these assessments relate to the identification of impaired waters under the Clean Water Act Section 303(d) requirements.

The primary issues for streams continue to be degraded habitat and polluted runoff. For lakes, it is Sewer Service Area Planning involves identifying a community's 20-year growth pattern to design cost-effective and environmentally sound sewerage systems. A sewer service area plan has maps of existing sewerage areas, adjacent land most suitable for new development, and areas where sewers should not go due to environmental constraints. Sewer service area planning is designed to provide structure to a community's wastewater collection system and plays an important role in keeping Wisconsin's water safe for drinking, recreation, and fish and aquatic life. Because the plans anticipate future growth they can be used as a tool to help consolidate wetland, shoreland, and floodplain protections in a community-based plan.

In "undesignated areas" (see above), sewer service plans identify future service areas for communities with populations exceeding 10,000 (as per NR 121.05(1)(g)(4)). Urban areas with wastewater treatment plants that treat 1.0 million gallons per day or more within standard metropolitan regions are included in the sewer service area planning process. There are 28 municipalities in the state that fall under this "undesignated area" definition. Most of these 28 areas have an approved sewer area

plan. Only a two communities that are required to have a sewer service area plan still do not have an approved plan.

Water Quality Standards

In Wisconsin surface waters are classified for the beneficial uses they are capable of supporting if controllable impacts to water quality are managed. Protections afforded surface waters are derived from a series of administrative codes, ranging from ch. NR102 through NR106, Wisconsin Administrative Codes. Ch. NR 102 provides the classification of waterbodies in the state. Water quality criteria for wetlands is provided in ch. NR 103. Ch. NR 104 identifies waterbodies that have specific water quality classifications other than warm water sport fish or forage fish communities (i.e., those that are outstanding or exceptional resource waters or those that are identified as marginal (limited forage fisheries or limited aquatic life communities). NR 105 provides standards for toxic substances and NR 106 details how to calculate water quality-based effluent limits (WQBELs) to meet standards found in NR 105.

Water Quality Classifications

NR 102 identifies water quality classifications for Wisconsin Surface Waters (see below). WDNR uses the state's fish and other aquatic life uses classification as the basis for its assessment procedures (see Chapter 2).

Fish and Other Aquatic Life Uses

Fish and other aquatic life uses are further subdivided in Wisconsin Administrative Code NR 102.04(3) in the following categories:

Cold water communities: These are surface waters that are capable of supporting a community of cold water fish and other aquatic life or serving as a spawning area for cold water fish species and includes, but is not limited to, surface waters identified as trout waters (Wisconsin Trout Streams, publications 6-3600(80)).

Warm water sport fish: These are surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sportfish, such as bass.

Warm water forage fish communities: These are surface waters capable of supporting an abundant, diverse community of forage fish and other aquatic life.

Limited-forage fish communities: These are surface waters capable of supporting only a limited community of forage fish and other aquatic life due to low flow, naturally poor water quality, or poor habitat.

Limited aquatic life: These are surface waters of severely limited capacity due to very low or intermittent flow and naturally poor water quality or habitat, capable of supporting only a limited community of aquatic life.

Surface waters classified in the limited forage fishery or limited aquatic life subcategories are not capable of achieving Clean Water Act goals. These waters are listed in Wisconsin Administrative Code NR 104.05 to 104.10.

Outstanding & Exceptional Resource Waters

Wisconsin has classified many of the state's highest quality waters as Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs). Chapter NR 102 lists the ORWs and ERWs. The identification of ORWs was one of the requirements for federal approval of the antidegradation policy. In the early 1990s WDNR conducted a statewide evaluation to determine which waters qualified for ORW and ERW classification. In 1993 and in 1996 waters were added to Chapter NR 102 as ORWs and ERWs after rigorous screening and public input processes. In 2002, the Public Service Commission donated Caldron Falls as a protected waterbody under the ORW/ERW program. Below is a summary of the number of waters that are classified in NR 102 as Outstanding and Exceptional Resource waters:

Table 1: ORW/ERW Waterbodies

	ORWs	ERWs - Number of Waters
Streams	220	1532
Lakes	97	
Flowages	6	

A total of 2,075 stream miles or 6.5% of the 32,010 perennial river miles in the state have been classified as ORW. A total of 3,661 stream miles or 12% of the river miles in the state have been classified as ERW. Of Wisconsin's 27,723 waterbodies, 1,855 (6.7%) are now classified in NR 102 as either Outstanding or Exceptional Resource Waters.

Recreational Use Waters

Surface waters in the fish and aquatic life use classifications may also be classified as recreational use waters. This classification assures standards protecting surface waters from fecal contamination. A bacterial examination of the water determines the suitability of a recreational use classification. As a result of this classification, municipal dischargers to recreational use waters may be required to disinfect their effluent.

Public Health and Welfare

All surface waters shall meet the human threshold and human cancer criteria specified in Wisconsin Administrative Code NR 105. The applicable criteria vary depending on whether the surface water is used for public drinking water supplies and the designated aquatic life use subcategory. All surface waters that provide public drinking water supplies, or are classified as cold water or warm water sport fish communities must meet taste and odor criteria as specified in NR 102.

Wildlife

All surface waters shall be classified for wildlife uses and meet the wildlife criteria as specified in NR 105.

Water Quality Classification Revision Process

Stream Classification Revision

An extensive list of streams and their designated aquatic life uses were promulgated by WDNR in 1976. Use designations are defined in NR 102 and represent a classification system that considers the type of aquatic life community that may be supported by a surface water and its naturally occurring background chemical (i.e., dissolved oxygen, pH, etc.), physical (i.e., temperature, flow, habitat, etc.), and biological (i.e., species of fish and other aquatic life present) features.

The WDNR is currently updating the aquatic life use designations and is repackaging the rules in a more logical, user-friendly format. Streams not meeting standards for fish and aquatic life, primarily due to natural conditions, were listed in NR104 in 1976. This system allowed the establishment of effluent limits in an efficient manner while also providing a level of water quality commensurate with the economic and cultural realities. Additional streams have been evaluated and their classifications will be included in a revised NR104. In addition, many of the classifications conducted in the 1970s have been reviewed and, based on new information, need to be reclassified to another Fish and Aquatic Life classification sub-category. These changes in classification typically cause a modification in water quality criteria and associated requirements (e.g. effluent limitations for point sources).

Phase I: Water Body Use Designation

To properly update stream classifications, revisions to chapters NR 102, 104 and 106 are underway. The revisions will be completed in two phases. Phase I revisions focus primarily on accurately updating current classifications listed in NR 104. Use designation changes included in Phase I revision efforts should not force a wastewater treatment plant (WWTP) upgrade – these revisions are

intended to make the rule current with respect to use designations and WWTP effluent limits. The proposed revisions to each of the Natural Resource code chapters are as follows:

To learn more go to: <http://dnr.wi.gov/org/water/wm/wqs/index.htm>

Chapter NR 102, *Water Quality Standards for Wisconsin Surface Waters*, will contain rule language that was previously located in NR 104. NR 102 is a more appropriate location for the language since the language is specific to designated use categories and water quality criteria necessary to support those uses for the surface waters of Wisconsin.

Chapter NR 104, *Uses and Designated Standards*, is the chapter that establishes uses and designated standards for surface waters of the state. Surface water use designations and variances included in this chapter have been updated. Further, specific waters that may be characterized as surface waters not able to support a Full Fish and Aquatic Life community are listed in this chapter.

Chapter NR 106, *Procedures for Calculating Water Quality Based Effluent Limitations for Toxic and Organoleptic Substances Discharged to Surface Waters*, is proposed to be re-titled. The purpose of this subchapter is to specify how the department will determine effluent limitations for substances discharged to waters that have been identified and designated as surface waters not able to support a Full Fish and Aquatic Life community.

Phase II: Water Body Use Designation

Phase II of the revisions will focus on further modifications to the listing of use designations in NR 104, as well as the exploration of several policy issues related to designating the use of a waterbody. Topics related to use designation have been identified that warrant additional thought and discussion. A Water Body Use Designation Advisory Committee (WBUD AC), comprised of members from the academic, environmental, and regulated community, has been charged with working through the topics. Several issues that have been identified for discussion including dealing with effluent discharges to various types of receiving waters, including cold water resources, Great Lakes waters, effluent channels and dry runs. There will also be additional research and discussion regarding how to appropriately classify wetlands to ensure that they are adequately protected from potential discharges. Finally, Phase II revisions will work through the aspects of implementation of new policy and procedure decisions into the existing use designation program. While these are some of the subjects scheduled for Phase II of the revision efforts, it should be noted that the focus of the effort might change over time, as different and/or additional needs are identified.

Proposed Classifications

Fish and Aquatic Life Stream Classification Guidelines

Surface water sources throughout Wisconsin vary in size, quality, and utilization, and can be grouped according to common characteristics. These groupings enable the Department to properly protect the resource while allowing the use of the resource by parties with various interests. To preserve and enhance water quality throughout the state, the following use designations have been established by WDNR: Fish and Aquatic Life, Recreation, Public Health and Welfare (including drinking water), and Wildlife. Of these classifications, the Fish and Other Aquatic Life classification is designed as a water quality management tool to qualitatively assess and designate fish and aquatic life uses for surface waters receiving waste discharges.

Within the Fish and Aquatic Life use designation, five sub-categories of uses have been proposed: Coldwater A, Coldwater B, Full Fish and Aquatic Life (FFAL), Limited Forage Fish (LFF) and Limited Aquatic Life (LAL). Minimum characteristics for each of these sub-categories are detailed in the guidance.

If there are controllable impacts on a specific waterbody that can be eliminated or reduced (e.g., point source discharges, construction site runoff, or landfill leachate), a waterbody could potentially have an improved **attainable use (currently referred to as potential use)**. The **designated (or potential) use** of a waterbody is the use that is selected and promulgated as a management goal.

When it is determined that a surface water needs to be classified (or re-classified), field data are collected and analyzed. These data include the assessment of existing information, fish communities,

habitat, water quality, and macroinvertebrates. Collected data are interpreted, compared to reference sites, and a final use designation determination is made. This use designation, once promulgated, establishes the linkage to water quality criteria that are used to manage the discharge of pollutants into the waters of the state.

Waterbody Assessment Implications

Modifications to the system on which Wisconsin bases its aquatic life use designations demands a review and revision to the way in which the state assesses its waterbodies for the 305(b) Water Quality Assessment procedure. The current aquatic life community-based system (described in Part III, Chapter 2), which is used hierarchically to identify use support levels for state level assessments – and, which is used in conjunction with the waterbody's codified use to identify additions to the state's 303(d) list of impaired waters, may no longer be in effect once new classification rules have been promulgated. In addition, use of a random stratified sample design for the state's baseline monitoring program requires the development of protocols to assess the condition of a waterbody in light of extrapolated data rather than the use of traditional monitoring and assessment protocols. This change also demands a re-evaluation and redesign in the way streams and lakes are assessed statewide. Thus, in the coming years, WDNR's water and fisheries programs work together to evaluate potential changes in how assessments are conducted as a precursor to designing a new system for determining use designation support for waterbodies.

Thermal Standards. Water temperature is very important to the health, reproduction, and function of aquatic organisms and plants, as they exist only within certain temperature ranges. Water quality standards that protect aquatic organisms and plants from human discharges of elevated temperatures or heat loads (i.e. thermal pollution) are an important component of the overall regulatory strategy for protecting aquatic environments. Sources of thermal pollution include:

- industrial discharges (e.g. power plants, manufacturing plants, etc.),
- discharges from dams,
- urban runoff,
- changes in land use (e.g. loss of trees and shrubs along streams, loss of wetlands, etc.),
- and agricultural runoff.

Wisconsin continues its revision of thermal water quality rules, with rule adoption planned for 2005.

Wastewater Management

WDNR has primary state management authority over wastewater treatment and disposal in the state. This management responsibility is accomplished through the implementation of the following programs and activities:

- Wisconsin Pollutant Discharge Elimination System (WPDES) permits program.
- Industrial pretreatment for discharges to municipal sewerage systems.
- Approval of plans for wastewater treatment and disposal facilities and practices ("facility planning")
- Enforcement and compliance assistance.
- Assuring continuing and sufficient wastewater management practices in municipalities through a compliance maintenance and reporting program.

WPDES Permit Program

The WDNR regulates municipalities, industrial facilities and significant animal waste operations discharging to surface waters or groundwater of the State of Wisconsin through the Wisconsin Pollution Discharge Elimination System (WPDES) Permit Program (See Section on Runoff Management for discussion of WPDES permits for stormwater). No person may legally discharge to surface

waters or the groundwater of the state without a permit issued under this authority. All permits issued under the WPDES permit program are either specific permits or general permits and may contain the following:

- Effluent limits for conventional pollutants and toxic substances in the discharge,
- Limitations on the quality and disposal practices for sludge (biosolids) and by-products solids,
- Pretreatment requirements, where applicable,
- Compliance schedules for facility improvements, and/or
- Monitoring and reporting requirements.

Specific permits are issued to individual facilities. The number and type of individual permittees currently regulated by the WPDES program as of January 2004 were 663 municipal permits, 430 Industrials and 130 CAFOs. These include major and minor facilities.

General permits are issued to cover a group of facilities with similar discharges which may be located anywhere in the state. Coverage under a general permit is conferred to each individual facility. The WDNR makes a determination on whether a particular facility is appropriately covered by a general or specific permit. There are 17 general permits that may be used to cover applicable discharges ranging from non-contact cooling water to land application to non-metallic mining operations. Two-thousand facilities are covered under a general permit.

Permit Backlog

The WDNR is not, in all instances, able to reissue permits before the 5-year term expires. The number of expired permits, however, is a small fraction of the total number of WPDES permits that are in effect at any given time. The goal of the WPDES permit program is to ensure that the Department does not exceed a statewide backlog of more than 10% at any time. As of January 1, 2004, the backlog of industrial and municipal permits, including both surface and groundwater discharges, was under the 10% goal (see below) and below that of many other states.

Under Wisconsin law, any permit that has expired continues in effect until it is reissued or revoked. Facilities with an expired permit, therefore, are restricted in the amount of pollutants they can discharge as if the permit has not expired.

Table 2. Wisconsin WPDES Permit Backlogs as of January 1, 2004

Total (minors and majors)	Expired Total	% Backlog	
Municipal	663	37	5.6%
Industrial	430	33	7.7%
(overall totals)	1093	70	6.4%
CAFOs	130	11	8.2%



Permits are not issued prior to the expiration date for several reasons including WDNR is awaiting additional data from the permittee, public or other comment necessitates additional review, rules are inadequate to address concerns with the discharge or a permittee is not in substantial compliance with the terms of the expired permit and enforcement action is underway.

In 2004 the Governor initiated a new permit tracking website for the public. It details both qualitative and quantitative WPDES permit issuance information.

Enforcement and Compliance Assistance

The WDNR monitors permitted discharges to assure permittees are complying with the terms and conditions of their permits. This “compliance assurance process” takes several forms and includes:

Compliance maintenance—working with and assisting facilities to remain compliant.

Compliance assessment—conducting inspections of facilities and on-site assessments, reviews of discharge monitoring reports and other reports for compliance, follow-up on self-reported violations.

Enforcement—formal actions taken when a significant violation is identified including notification of a violation of a permit condition, formal enforcement conferences and/or contacts and referral to the state Department of Justice (DOJ).

Due to the excellent record of compliance of major permittees, the Department has revised its inspection strategy to allow it to focus greater attention on minor permittees who more frequently experience compliance difficulties. In June 2004, WDNR developed an updated enforcement strategy to assure there is appropriate and timely response to permit violations.

WPDES permittees have an excellent record of compliance. Table 3 shows the number of cases of significant violations identified during 1999, 2000 and 2001, along with the other formal enforcement data:

Table 3. Significant WPDES Violations

Enforcement Activity	2001	2002	2003
Number of wastewater cases referred to DOJ	9	17	10
Number of stormwater cases referred to DOJ	2	3	2

Effluent Limitations

Each permit contains effluent limitations based on the type of facility or water quality-based effluent limitations calculated to meet water quality standards. Effluent limitations may regulate the amount of biochemical oxygen demand, suspended solids, pH, phosphorus, ammonia, chlorine, other toxic substances, or other conditions depending on the type of facility and the water to which it is discharged. The need for whole effluent toxicity testing is evaluated for permits that discharge to surface waters. Further information on the results of toxicity testing of wastewater effluents is contained in this report under Ecosystem Health Assessment. Land application systems normally regulate the amount of nitrogen, chlorides, or other materials that may contaminate the groundwater.

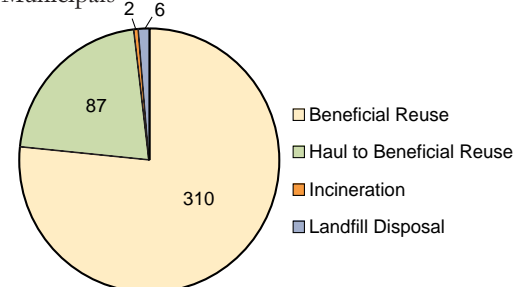
Biosolids and Sludge Disposal

About 40 percent of the costs incurred to construct, operate and maintain a municipal wastewater treatment facility come from processing, handling and recycling the residues—the sludge or biosolids—that result from wastewater treatment. Most municipal and many industrial facilities in Wisconsin land apply their wastewater treatment sludge or biosolids on agricultural land as a soil conditioner or fertilizer. Approximately 98 percent of municipal sludge generators, for example, either ultimately apply it on farmland or distribute it for individual use. Of 406 municipal facilities which must remove sludge at least annually, 310 directly beneficially reuse it, 87 haul it to facilities who beneficially reuse it, two incinerate it, and six dispose of sludge at least part of the year in a licensed landfill.

There are an additional 243 permitted facilities which treat wastewater in lagoon systems or systems which only require removal of sludge on an infrequent basis (10 - 20 year cycles). These facilities almost universally land apply their sludge.

Regulations and permit conditions control the amount of sludge or biosolids that may be land-applied depending on the soil, slope, time of year, proximity to residences and wells and other factors. Application rates are limited to the agronomic needs

Figure 6. Disposition of Sludge Waste—Municipals



of the crop to be grown and soil analyses are required at least every four years. Phosphorus levels in sludge have increased as Wisconsin has limited the amount of phosphorus that can be discharged directly to surface water in the effluent. Therefore, sludge must be managed in a way that will keep it on the land and minimize the potential for runoff to surface waters. The state also regulates all septage pumped from 698,000 septic systems (300,000 of them on required maintenance schedules) and 30,000 holding tanks. Septage must either be taken to a wastewater treatment plant for further treatment or directly land-applied. The same site criteria apply to septage as to sludge.

Pretreatment

Pretreatment dischargers are industrial facilities that do not discharge their wastewater directly to the waters of the state, but instead discharge into a municipal sewerage treatment plant. The WDNR has been delegated the authority to administer this federal program. Twenty-six municipal governments in the state are responsible for meeting state and federal requirements for implementation of pretreatment requirements. These "control authorities" regulate discharges to their systems through the issuance of permits and other local controls. Industrial discharges that are subject to the pretreatment requirements of the state, but are not within the systems of these municipal control authorities, must obtain permits directly from WDNR. There are a total of 165 facilities that receive permits directly from WDNR.

Over the past several years, the amount of WDNR oversight of the pretreatment program has declined substantially. This reduction is due to a variety of reasons including loss of staff to other high priority activities or budget reductions and a determination that most of the delegated municipalities are adequately implementing the program. In the past couple of years, however, the department has taken enforcement action against delegated municipalities for program violations. By implication, this indicates that the program is at a point of being so significantly reduced that it may be losing its effectiveness and relevance. The WDNR is reviewing this program to determine what actions are needed, if any, to assure the continued implementation of this program while at the same time reducing administrative overhead. In the past couple of years, the Department has added a pretreatment component to the SWAMP system, thereby enhancing program management.

Significant Wastewater Management Policy and Program Issues

Sanitary and Combined Sewer Overflows

In the period from 1998 through 2000, and again, in 2004, heavy rains in the Milwaukee urban area resulted in numerous incidents of overflows from the sanitary and combined sewerage systems serving the Milwaukee Metropolitan Sewerage District (MMSD) and tributary (satellite) communities. These overflow events resulted in impairments to local surface waters, and caused considerable public concern about the efficacy of these systems. In response, the Department published a report in 2001 describing the incidents and presented a lengthy series of recommendations for addressing the issue of sanitary sewer overflows in the Milwaukee area and statewide. In addition, this investigation resulted in the Department initiating an enforcement action against the MMSD for permit violations. The result of this action is the development of a stipulation requiring substantial work in the MMSD system to assure that sanitary sewer overflows are being addressed by the local governments. The Department has also initiated efforts to revise state regulations that govern the overflows from sanitary sewerage systems. In August 2004, WDNR referred to the state Department of Justice, the MMSD and 29 satellite communities for SSO violations.

Power Plants

As in many parts of the country, projected energy shortages have been identified as a concern. In response, several independent power producers as well as traditional utilities have proposed construction of power generating facilities in Wisconsin. Most of these plants are simple cycle or combined cycle gas turbine plants that recirculate cooling water and use cooling towers. Due to recent changes in state laws regarding the siting of power plants, permit actions in response to these proposals have been elevated in priority. Additionally, the process requires substantial interaction with the project developers, and severely truncates the time scales for permit actions. As of late

2003, there were at least 5 power plant projects being reviewed by WPDES permit staff. These new projects affect the ability of the program to keep pace with the ongoing permit reissuance workload. In 2003, the WDNR established an Office of Energy to coordinate review of energy related projects. There will be a continuing workload associated with these projects for the foreseeable future.

Chlorides

The Department adopted water quality standards and WPDES program implementation procedures in 2000. Permit applications and point sources are being reviewed for the inclusion of chloride limits and compliance schedules. Source reduction activities to effectively reduce chlorides in discharges by significant amounts are difficult to implement. Permittees continue to evaluate opportunities and impediments to chloride reduction and the Department will continue to pursue reductions wherever possible. In some instances, reductions may be technologically and economically not feasible.

Mercury

Water quality standards and point source implementation procedures to control the discharge of mercury were enacted in 2002. This rule was necessitated by the enhancements to the analytical detection improvements and the presence of mercury at very small, but detectable, concentrations in almost all wastewater effluents. This policy establishes a system for prioritizing permittees according to their potential for detecting mercury in their wastewater effluent and, if present, requiring implementation of source reduction measures to reduce the amount of mercury in a discharge. Permittees are required to submit and implement a "pollutant minimization program" to effect technologically and economically feasible reductions of mercury in their wastewaters.

Ammonia

Regulations were adopted establishing water quality standards and WPDES permitting procedures for ammonia in 2004. Although the Department has been regulating ammonia in many discharges since the late 1970s using a relatively consistent procedure, EPA's revision to the water quality criteria for ammonia in 1999 provided the impetus to enact rules governing the discharge of this substance. The new rules will not substantially impact whether a permittee has to replace or construct entirely new wastewater treatment facilities to attain the new standards. Rather, small changes in effluent limitations may occur and require some modifications to operations to meet the limits. One aspect of the rules is to establish a variance process that will allow wastewater stabilization lagoon systems additional time to meet the ammonia limitations. In many instances, these systems will be replaced by more complex wastewater treatment technologies with an associated increase in costs.

Temperature

Water quality standards for temperature will be adopted in 2005. Existing standards were declared invalid for many dischargers more than 20 years ago, and the Department's ability to regulate heated water discharges is limited. Significant efforts have been made to establish scientifically valid and protective temperature criteria to protect different aquatic life communities. Temperature is a critical factor in aquatic life protection, and heated water from point source discharges must be appropriately regulated to assure protection of those organisms (see additional discussion under "Water Quality Standards").

Waterbody Use Designations

The designated uses of waterbodies is a significant factor in establishing effluent limitations on discharges from point sources. The current system for designating aquatic life uses for surface waters is in need of review and updating. WPDES permittees may be substantially impacted by this effort and permit limits may change as use designations change or are established based on new scientific procedures and information (see additional discussion under "Water Quality Standards").

System for Wastewater Applications, Monitoring and Permits (SWAMP)

An effective data management system is essential for managing the WPDES permit system. The System for Wastewater Applications, Monitoring and Permits (SWAMP) features a consistent permit drafting system, storage capacity for monitoring and attribute data, linkages of monitoring and compliance data to permit limits and conditions, and an ability to track compliance, enforcement and other information related to the permit.

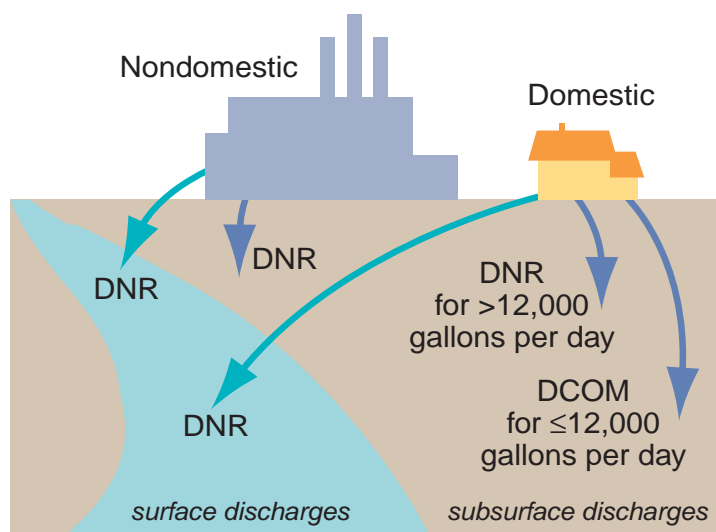
The SWAMP database was developed to provide access to monitoring, facility and inspection information, and permit drafting systems. The system was first available for use in late 1998 and additional segments and enhancements have been added as system use increased and funding became available. All permits are now being written through use of the SWAMP system, all Discharge Monitoring Report (DMR) data is being entered into the system, and it is being used by staff to assess compliance. The time needed to draft a permit has been significantly reduced as a result of the efficiencies gained through use of the system. In 2004, the Department began accepting discharge Monitoring Report information electronically for a limited number of facilities, creating further program efficiencies. It is expected that all facilities will be able to electronically submit WDNR data by 2006. Web-based permit applications are being developed now and will be online by early 2006.

Figure 7. DCOMM/DNR Wastewater Regulation Jurisdictional Boundary

Wastewater Systems Plan Review

Wisconsin Statutes require the owners of sewerage and industrial wastewater systems to submit plans and obtain plan approval from the Department of Natural Resources for new construction or modification of sanitary sewers, wastewater pumping stations, wastewater treatment plants, large seepage storage facilities and effluent outfall sewers. Plan review is intended to be a proactive and preventive component of the Department's Watershed program, designed not only to ensure compliance with applicable regulations, but also to promote attainment of various objectives beneficial to system owners, operators, the environment, and the general public.

Plan review provides an intervention point in the wastewater treatment system planning process that promotes an exchange of information, technical assistance, coordination between owners and various agencies, documentation of sewerage system infrastructure, and development of appropriate technologies for statewide use. For major projects, plan review includes an evaluation of project environmental impacts and an opportunity for public input.



Privately—Owned Onsite Wastewater Treatment Systems

The Wisconsin Department of Commerce (DCOMM) has authority to review and approve installation of wastewater treatment systems that use subsurface disposal for the wastewater. These are normally in the form of septic tanks and drain fields, although DCOMM has adopted new rules in early 2000 that allows the use of alternative treatment methods prior to disposal into the subsurface systems. WDNR regulates facilities greater than approximately 12,000 gallons per day, and DCOMM has the review and approval authority for smaller systems (see Figure 7). WDNR began to issue WPDES permits for large new and replacement systems in 2000. WDNR additionally retains review authority for all sizes of systems that contain and are used for the disposal of non-domestic wastewa-

ter. Some of these systems fall within the regulatory authority of Class 5 Injection wells under the Safe Drinking Water Act and are reviewed to conform to those regulations.

To learn more go to: <http://dnr.wi.gov/org/water/wm/ww/>

Permit Program Policy Initiatives

The following policy initiatives have been underway in 2002-2004:

- Incorporating new requirements for Mercury and Ammonia into permitting and SWAMP,
- Incorporating new requirements for Confined Animal Feeding Operation (CAFO) permits into permitting and into SWAMP,
- Upgrading capabilities for automatic generation of CAFO inspection reports in SWAMP,
- Incorporating the capability to track pretreatment facilities in SWAMP, and
- Updating geographic data reference fields in SWAMP to reflect GIS data standards at the WDNR.
- Creating electronic guidance and documents ("EGAD"), an intranet database so all policy, guidance and rules are located in one place

Innovation in Pollution Reduction

The Bureau of Cooperative Environmental Assistance works primarily with the industry regulated community to implement activities through innovative, non-regulatory programs. The following examples apply to industries within the WPDES program:

- An Innovation Stakeholders Group has been convened as an informal, quarterly forum of business, consulting, government, environmental and academic leaders for the exploration of environmental, economic and social issues associated with environmental regulation.
- WDNR has been using environmental management systems for the past five years as a part of enforcement settlements, compliance strategies and "beyond compliance" programs.
- Three ongoing programs address environmental performance within industry sectors including the Pollution Prevention Partnership (Paper), 5 Star Program (Dry Cleaners), and Environmental Excellence Award (Asphalt Pavers).
- Recognition awards are provided through the Federation of Environmental Technologist's "Governor's Environmental Excellence Awards" and the Wisconsin Manufacturers and Commerce "Business Friend of the Environment" award.
- The Environmental Cooperation Pilot Program (Program) has allowed seven participating companies, the Department and the public to implement regulatory streamlining, energy reductions, emissions reductions, and materials reuse and recovery.
- A Permit Primer was created as an interactive web tool for managing the full scope of permitting and prevention strategies to avoid the need for permitting or reduce permit requirements for new and expanding businesses.
- The Dairy Gateway project (building a sustainable dairy agriculture region) and the Community Mercury Reduction program are using the strength of community participation and building networks to achieve better environmental results than would be achieved through traditional regulatory approaches.
- The Wisconsin Pollution Prevention Partnership Web site (<http://wip2.uwex.edu>) is a jointly maintained site with resources, contacts and links to pollution prevention activity affecting all media.
- A full-scale strategy is being implemented for the reduction in mercury containing products, reductions in air emissions (voluntary and rule based) and the community mercury reduction program to prevent mercury in wastewater.
- Legislation (Environmental Results Act or "Green Tier") has been enacted to provide an opportunity that combines growth and environmental improvement, but also for a program that can build new and better working relationships with businesses, communities and environmental groups. The legislation also provides the potential for new frameworks to make compliance strategies more effective, administrative burden more manageable and administrative direction more focused on significant environmental problems.

- The Regulatory Reform Act of 2004 contains additional provisions on permit reporting requirements that in the view of industries and others, should improve efficiency and effectiveness of WDNR's programs.

Management of Polluted Runoff

Control of polluted runoff continues to be one of the most significant challenges in the state's effort to protect the quality of Wisconsin's water resources. Urban and rural land use activities are the source of runoff pollutants entering Wisconsin's lakes, streams, wetlands and groundwater. Common pollutants in runoff include the following:

- Sediment from construction sites, croplands, and other urban and rural sources,
- Nutrients and pesticides from both urban and rural sources,
- Oil, grease, heavy metals, and other toxic materials from impervious surfaces such as streets, highways, roof and parking lots, and
- Farm animal wastes from barnyards and pet wastes from urban areas.

The effects of polluted runoff can be seen in degraded fish habitat, fish kills, nutrient-loaded waters causing heavy weed growth, degradation of drinking water supplies, siltation of harbors and streams, diminished recreational uses, and changes in the natural hydrology of streams, rivers, and lakes.

To address these pollutant problems, water quality managers encourage landowners and municipalities to implement and install "best-management practices" (BMPs) in rural and urban areas. BMPs, such as buffer strips, nutrient management, manure storage facilities, or detention ponds, help to prevent movement of pollutants to surface water and groundwater.

The state's efforts to restore water resources affected by polluted runoff center around Wisconsin's runoff management program. The WDNR worked with state agencies, local governmental units and the affected publics to develop the redesigned runoff management program. The program redesign is embodied in nine administrative rules promulgated in October 2002, eight to be administered by the WDNR and one to be administered by the Department of Agriculture, Trade and Consumer Protection (DATCP).

Three primary components of the WDNR's runoff management program include the implementation of the three runoff management grant programs, point source permitting of storm water and agricultural runoff sources, and implementation of state regulatory performance standards. The management strategy for these programs is aimed at abating urban and rural polluted runoff. Wisconsin has been recognized as a leading state in the effort to control polluted runoff.

The runoff management program is a joint effort of the WDNR, the DATCP, county Land Conservation Departments (LCDs), and municipalities, with assistance from a variety of federal, state, and local agencies, particularly the USDA Natural Resources Conservation Service (NRCS) and the University of Wisconsin-Extension.

Priority Watershed/Lake Program

The Priority Watershed/Lake Program provides financial assistance to local units of government in selected watersheds to address land management activities, which contribute to urban and rural runoff. The WDNR issues grants for the implementation of watershed/lake projects through a cost-share approach. The grantees use the funds to reimburse costs to landowners for installing voluntary BMPs. From the start of the program in 1978 through December 31, 2003, approximately \$175 million in cost-share grants has been provided to these priority watershed/lake projects.

Since the program began, 86 of the state's watersheds and lakes were designated as priority watershed or lake projects (see Figure 8). Thirty-eight (38) of the 86 projects have been closed or completed. All of the remaining projects have been approved and are in the implementation phase.

Priority watershed/lake project goals focus on water quality improvements or protection resulting from reductions in pollutant levels delivered to streams, rivers, and lakes. Annual report data for 2002 indicate that projects are making progress towards reducing phosphorus from barnyards and upland sediment/soil loss. Approximately 68 percent of the projects are meeting their barnyard phosphorus

reduction goals by 50 percent or more. Fifty-four (54) percent of the projects are meeting their upland sediment/soil loss reduction goal by 50% or more. In 2002, 17 projects reported a cumulative total of 325,815 feet of streambanks or shorelines that were stabilized, and a lake project reported 75,700 square feet of shoreline erosion control established. Nineteen (19) of the 40 projects that set streambank or shoreline erosion control goals are meeting them by 50% or more.

Act 27, passed in 1997, created new competitive funding programs open to applicants statewide (see below), rather than just priority watersheds/lakes. Funding for ongoing watershed and lake projects will continue through 2009; no additional projects will be funded.

Additional Runoff Management Grant Programs in Wisconsin

The Wisconsin Legislature created two additional grant programs, the Targeted Runoff Management and Urban Nonpoint Source and Storm Water Grant Programs, to further address the effects of polluted runoff statewide. Both programs, administered by WDNR, provide competitive financial awards to control polluted runoff. Grant applications are scored based on fiscal accountability, cost effectiveness, water quality, extent of pollutant control, extent of local support and likelihood of project success. The funded projects are site-specific, generally smaller than a sub-watershed, and are targeted at high-priority resource problems.

Targeted Runoff Management Grant Program

The Targeted Runoff Management (TRM) Grant Program provides financial assistance to rural and urban governmental units. The maximum cost-share rate available to TRM grant recipients is 70 percent of eligible project costs, up to a maximum of \$150,000 (total state share). Local governments that are awarded TRM grants may use the funds on lands they control or make the funds available to private landowners. To date, TRM grants have funded construction of rural and urban best management practices. The projects last from two to four years. Please refer to Table 4 for additional information regarding the TRM grant projects. Since 1999, 47 agricultural and 46 urban projects have been funded by TRM grants. Approximately \$8,818,186 was authorized to fund these projects. Thus far, 41 of the 93 projects have been completed.

Urban Nonpoint Source and Storm Water Management Grant Program

The Urban Nonpoint Source and Storm Water Management Grant Program provides funding to urban areas with a population density of 1,000 people per square mile or greater, where there is a commercial land use, or non-permitted privately-owned industrial land. Recipients can receive 70 percent cost share for storm water planning, informational and educational activities, ordinance development and enforcement, training and design. Eligible best management practice construction costs (ie., detention ponds, streambank stabilization, shoreline stabilization) and are cost-shared at 50 percent. The funded projects last between two to three years. Since 2000, \$18,890,795 has funded 71 planning and 73 design/construction projects (Table 4).

Storm Water Management

WDNR regulates storm water discharges through NR 216, Wis. Adm. Code, through three categories of storm water discharges – municipal, industrial and construction sites. WDNR has issued permits to 32 Municipal Separate Storm Sewer Systems (MS4s), and has 40 additional MS4s in the application process. Revisions to ch. NR 216 to reflect phase II of the federal law were sent to the State legislature for review in March 2004. Approximately 250 MS4s, including cities, villages, towns, counties and state and federal institutions, will need permits once the Phase II regulations are implemented.

Most sediment entering urban lakes, streams, and wetlands originates from construction sites. The amount of sediment that comes off a construction site per acre is generally an order of magnitude greater than the amount that comes from agricultural cropping practices. Construction site pollutants include sediment, nutrients (phosphorus and nitrogen), heavy metals, oil, and grease. WDNR permits 500 new construction sites each year for sites disturbing five or more acres of land. Phase II storm water regulations will require construction sites one acre or more land disturbance to

obtain permit coverage and there are estimated to be 3,000 to 4,000 construction sites that will require permit coverage annually in Wisconsin.

Approximately 5,800 industrial facilities are covered under a WPDES storm water general permit. The WDNR has issued six general permits to cover storm water discharges from industrial facilities. Three of these permits were drafted specifically to cover one type of industry each, namely scrap recycling, used auto parts recycling, and non-metallic mining facilities. The scrap and auto parts recycling permits include the option for a facility to join a Cooperative Compliance Program (CCP). A CCP is an organization that provides additional training and auditing of its members and provides compliance reports to the WDNR. More than 60% of permitted facilities have voluntarily joined a CCP, and those facilities have done substantially better at maintaining compliance than the non-CCP managed facilities. Thus, the CCP has been successful in its first 4 years of operation.

Table 4. Targeted Runoff & Stormwater Grants

Grant Type	CY 2001			CY 2002		
	Grant Funds	# of Projects	# Completed	Grant Funds	# of Projects	# Completed
Agricultural	\$466,361	4	2	\$1,423,924	12	8
Urban	\$564,350	4	2	\$512,670	8	4
Subtotal	\$1,030,711	8	4	\$1,936,594	20	12
SW Planning*				\$952,950	19	8
Design/Const.**				\$5,861,917	28	8
Subtotal				\$6,814,867	47	16
CY 2003						
Grant Type	Grant Funds	# of Projects	# Completed			
Agricultural	\$1,703,370	19	4			
Urban	\$664,750	12	0			
Subtotal	\$2,368,120	31	4			
SW Planning*	\$1,252,630	21	0	* stormwater planning		
Design/Const.**	\$2,067,480	20	2	** Design and Construction		
Subtotal	\$3,320,110	41	2			

Indicator of stream quality: Ash Creek Macroinvertebrate Sample



Non-Agricultural Performance Standards

On October 1, 2002, Wisconsin promulgated non-agricultural performance standards under ch. NR 151, Wis. Adm. Code.

The performance standards apply to construction site development and post-construction management of storm water runoff as well as runoff pollution from transportation facilities, including highways, railroads, and airports. To the maximum extent practical and by design, the construction performance standard requires an 80% control of sediment. The post-construction standards are also by design with an 80% total suspended solids control to the maximum extent practicable. Additional requirements include buffers for streams, lakes, and wetlands, peak flow control, and infiltration where feasible and so that groundwater is protected from potential contamination. Chapter NR 151 also includes total suspended solids controls for permitted MS4 facilities and general information and education requirements for all urbanized areas. The transportation performance standards generally parallel the non-agricultural performance standards. Wisconsin contractors are now required to provide long-term post-construction storm water controls in addition to controlling runoff during construction.

To learn more go to: <http://dnr.wi.gov/org/water/wm/nps/index.htm>

Model Ordinances for Storm Water Management

Implementation of non-agricultural performance standards by cities, counties, towns, and villages will be critical to achieving water quality goals. Although the state has ultimate authority for enforcing these standards, local regulation will greatly enhance their implementation. The WDNR has developed two model ordinances to help assure statewide consistency in storm water regulations. One ordinance covers regulation of construction site erosion, the other post-construction storm water runoff. These ordinances are included in ch. NR 152, Wis. Adm. Code. The performance standards contained in these ordinances are consistent with the non-agricultural performance standards contained in ch. NR 151, Wis. Adm. Code. Adoption of either ordinance by a local governmental unit is voluntary, although the department strongly encourages that any local regulation be at least as stringent as the state's performance standards. The WDNR makes these ordinances available to local governments and provides assistance to local governments that wish to use the models as a basis for local regulations.

Agricultural Runoff Management

Approximately 38,000 active livestock operations exist in Wisconsin. Manure from livestock operations contains organic materials, nitrogen, phosphorus and other water pollutants. Through WPDES permits issued under ch. 283, Wis. Stats., and ch. NR 243, Wis. Adm. Code, the WDNR has helped to avoid many water quality impacts from larger-scale livestock operations. In addition, the WDNR has used the Notice of Discharge (NOD) program under ch. NR 243, Wis. Adm. Code, and the agricultural performance standards and prohibitions promulgated in ch. NR 151, Wis. Adm. Code, in October 2002 to address water quality impacts from many smaller-scale livestock operations in the state.

WPDES Permits

Water quality concerns associated with livestock operations with 1,000 animal units (AU) or more (also referred to as Concentrated Animal Feeding Operations or CAFOs) are addressed through the WPDES permit program. One thousand (1000) AUs are approximately equal to 700 milking cows, 1,000 beef cattle, 2,500 swine or 55,000 turkeys. These operations are required to obtain a WPDES permit that addresses storage, runoff, and land application of manure and other process wastewaters from these operations. There are about 126 CAFOs permitted under the WPDES program. (NOTE: one individual permit covers approximately 50 poultry operations owned or operated by the same company.) The WDNR has experienced a significant increase in the number of operations applying for permits in recent years, especially in the dairy sector. The WPDES permit program meets or exceeds federal NPDES requirements for livestock operations with 1,000 AUs or more, particularly in the areas of addressing groundwater quality impacts. USEPA recently revised its regulations for

CAFOs, and Wisconsin is in the process of modifying ch. NR 243, Wis. Adm. Code, to reflect changes at the federal level. To this end, WDNR formed an advisory committee to provide input on revisions to ch. NR 243, which are expected to be complete by the spring of 2005.

Addressing Water Quality Impacts from Operations with Fewer than 1,000 AUs

WDNR regulates livestock operations with fewer than 1,000 AUs that have discharges that significantly affect water quality through the Notice of Discharge (NOD) Program. In addition, under ch. NR 243, operations with 301 to 999 animal units that have discharges that meet the federal definition of a "point source" are also required to apply for a WPDES permit. With the promulgation of agricultural performance standards and prohibitions under ch. NR 151 (described below), the WDNR has an additional tool to address impacts from smaller-scale livestock operations as well as impacts from crop production. The statutory authority under ch. 281, Wis. Stats., and the creation of ch. NR 151 also provide local governments (e.g., towns and counties) the authority to enforce agricultural performance standards and prohibitions.



Notice of Discharge

NODs may be issued to smaller-scale livestock operations if an on-site investigation reveals the presence of a discharge to waters of the state. Technical assistance to control the discharge is typically available through the county Land Conservation Departments (LCDs) and cost-share financial assistance can be obtained through local, state and federal cost-share programs. If the water quality impact is not the result of a discharge that meets the federal definition of point source, cost sharing must be provided to cover at least 70 percent of eligible costs. Throughout the process of addressing impacts identified in an NOD, WDNR may conduct follow-up investigations to monitor compliance. A livestock operator who fails to implement necessary corrective measures within a specified timeframe is subject to a loss of cost-share funding and may be required to obtain a WPDES permit from the WDNR. Historically, the NOD program has been based on citizen complaints against livestock operations. The WDNR has changed to a targeted approach, investigating impacts from livestock in areas draining to Impaired Waters (Clean Water Act Section 303(d) waters) and high quality waters (Outstanding and Exceptional Resource Waters) instead of relying solely on citizen complaints.

Six NODs were issued during the 2002-2003 time period. For all NODs where cost sharing was provided, the average grant amount was approximately \$20,000 with a range of \$144 to \$179,121. About 55 percent of the livestock operations that received NODs from the WDNR received cost-share grants. Most livestock operations that received funding corrected their problem. About nine percent of the livestock operators failed to take required actions under the NOD and have been issued WPDES permits or have a WDNR enforcement action pending.

Agricultural Performance Standards and Prohibitions

The WDNR, in consultation with the DATCP, codified statewide performance standards and prohibitions for all agricultural operations in ch. NR 151, Wis. Adm. Code. These include standards for sheet, rill and wind erosion; manure storage and clean water diversions; and four manure management prohibitions (no overflow of manure storage facilities; no manure stacking near surface waters or on porous soils; no direct runoff from barnyards/feedlots to waters of the state; and no unlimited livestock access to water of the state). These standards and prohibitions are intended to occur through county Land Conservation Departments for crop producers and livestock operators with fewer than 1,000 AUs. Since promulgation of ch. NR 151, the WDNR has issued three notices of noncompliance with state standards and prohibitions.

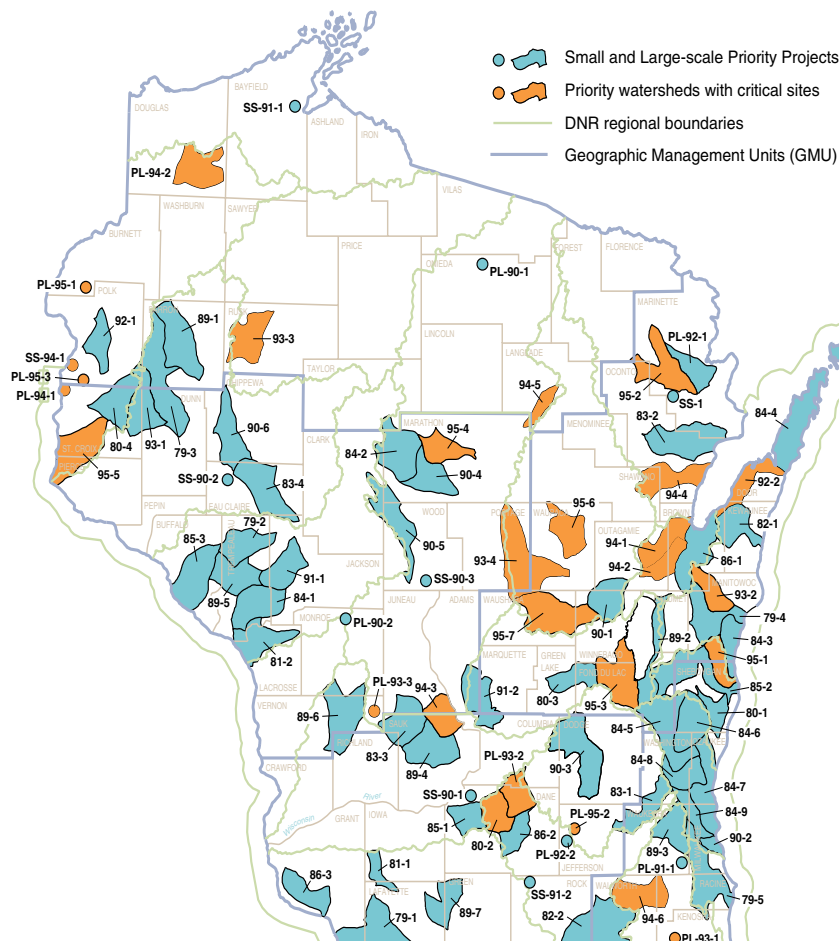


Figure 8 Priority Watershed Projects

Financing Compliance with Performance Standards

The total estimated annualized cost to implement the performance standards is \$92 million. The estimated portion for state government is \$22 million (24%), for local government is \$46 million (50%) and for private landowners and operators is \$24 million (26%). The majority of the local government and private sector costs are associated with meeting the non-agricultural performance standards. Sources of government funds include state bonding, segregated and general purpose revenue sources for cost-sharing and local staff, the state clean water revolving loan fund, federal programs, including EQIP, CRP, CREP and section 319, and local funding sources, including county cost-share programs and storm water utilities. These funds are needed to meet standards across the state, including waters listed as impaired on the Clean Water Act Section 303(d) list.

Dam Management

Wisconsin's 3,500 dams have a significant impact on the state's river systems. Many dams in Wisconsin served useful purposes, ranging from the generation of power to supporting recreational opportunities. Responsible individuals or municipalities own the vast majority of these dams. When faced with a decision to repair or reconstruct a dam, owners are always provided with a range of options, including removal. WDNR does not issue orders to remove a dam in situations where owners want to repair a failing structure and have the financial capability to do so. In selected cases the WDNR advocates for removal of a dam or may establish financial incentives to facilitate removal.

Dams can also cause water level fluctuations, changes in water temperature and oxygen levels, sedimentation leading to inhibition of fish movement, habitat loss, and fish mortality. Under the authority of Chapter 31 created in 1917 under the Water Power Law, the state has responsibility for and oversight of

- Dam permitting
- Dam safety, construction, operation and maintenance
- Alteration or repair of dams
- Dam transfer and dam removal
- Water level and flow control

Dam Safety

Wisconsin's Dam Safety Program was developed under Chapter 31 to ensure that dams are safely built, operated and maintained. Three state Natural Resources regulations provide structure to the program. NR 333 provides design and construction standards for large dams, NR 335 covers the administration of the Municipal Dam Repair and Removal Grant Program, and NR336 covers the administration of a new grant program to remove small or abandoned dams.

The authority under Chapter 31 includes approval of plans for dams, alteration or additions to an existing structure and removal of a dam. Chapter 31 requires the owner of a dam to operate and maintain their dam in a safe condition. The owner can initiate repair, reconstruction or removal actions. However, dam removal is more frequently the result of a failure or of an inspection finding significant defects requiring major repairs.

Dam Removal

The decision to remove a dam is primarily an economic decision made by the dam owner. Dam removal, which requires WDNR approval, must follow specific guidelines to assure protection of life, health, and property, as well as the surrounding environment. Chapter 31 requires the WDNR

to inspect all of the large dams in the state at least once every 10 years. Approximately 1,130 of the state's dams are classified as large dams, which are over six feet high and impound more than 50 acre-feet of water or they are 25 feet or more in height and impound more than 15 acre-feet of water. If these dams fail, they can cause loss of life or significant property or environmental damage.

In the last 20 years, over 50 dams have been removed from the state's waterways. Most of these were economic-based decisions made by the dam's owner or were abandoned dams where a responsible owner could not be found. There is a growing awareness of the negative affects dams can have on river ecosystems. Where dams have been removed, significant improvements have been noted in water quality, habitat and biodiversity at many of these sites. In recent years, the DNR has been more proactive in discussing potential habitat and water quality benefits from dam removal. Integrated management plans (see Chapter 3: Rivers and Streams) identify rivers that would benefit from dam removal in a given basin. WDNR has worked with partners to advocate for the removal of a dam or helped establish financial incentives to facilitate removal. See Chapter 3 for case studies on dam management and removal.

To learn more go to: <http://wi.dnr.gov/org/water/wm/dsfm/>

Dam Relicensing

The Federal Energy Regulatory Commission (FERC) is responsible for licensing the state's hydropower plants and reviews the 30- to 50-year-old leases to ensure that they meet federal regulations for safety and resource protection. Since 1993, 55 licenses have expired in the state, with 17 of those between 1998 and 2001. Most facilities operate under interim annual licenses until FERC completes its reviews.

DNR is actively involved in the FERC relicensing. The Department's regulatory role was expanded through Federal court cases to require facility receipt of a State water quality certification under Section 401 of the Clean Water Act. FERC facilities must evaluate both direct and indirect impacts to water quality, reflecting a recognition of the role of nearby land use on water quality, for example. Issuing a Water Quality Certification requires the applicant to conduct studies and provide information about intentions concerning anticipated changes in land use of owned properties near the dam and reservoir. Utilities often own substantial acreage of wild and scenic property adjacent to the dam and reservoir.

Preparing a Land Use Position Paper Related to Transfer of FERC facility lands

In 2001, WDNR prepared an issue paper regarding sale of FERC owned properties. Licensed hydropower facilities in Wisconsin and nationally have increasingly made requests to the FERC to sell land or change land use within project boundaries. Much of this land is wild, scenic and undevel-

oped and contributes to maintenance of high quality surface water resources. Although utilities can realize additional income and reduced long-term maintenance costs through land sales, those that result in subsequent development can have substantial impacts to the quality of lakes and rivers. The impacts of property sales are site specific and in fact may include cases where a land sale may be compatible with the Department's local land management interests.

There should be individual analyses of proposed land use changes in light of state land acquisition plans and license conditions. Further early coordination work among regional staff can help determine where hydro project lands overlap planned state land acquisitions, which can then be followed by legal intervention or acquisition.

Unless protected land use is guaranteed, the Department should oppose FERC approval of hydropower facility property sales or changes in land use. By analyzing public benefits (using current land acquisition plans) the Department can decide on a case-by-case basis, the best course of action.

Issuance of Run of River Guidance

In 2001, WDNR issued guidance to manage the concept of Run-of-River flows. Under Section 31.02, Wis. Stats., the Department may regulate and control the level and flow of water for dams on navigable waters. Pursuant to Section 401 of the Clean Water Act and under Wis. Admin. Code NR 299, Water Quality Certification (WQC) authority, the Department may also regulate flows and water levels on FERC licensed hydroelectric dams. The guidelines are designed to help assure consistent regulation of run-of-river operations were appropriate and provide s training tool for new staff and interested parties.

In most cases, a run-of-river operating mode should be used to minimize disruptions to natural river flows. At all times there must be water flowing from the dam (includes powerhouse, spillway or diversion channel) so that at any time, outflowing water equals inflowing water into the reservoir.

Contaminated Sediment Management Program

Contaminated Sediment Management in Wisconsin involves a multidisciplinary approach within the Department and coordination with and other state and federal agencies and private partners. The goal of the program is to restore surface waters to assure the applicable water quality standards are achieved where resource uses have been impaired by the presence of contaminated sediments. Managing contaminated sediments and floodplain soils associated with Wisconsin's inland and Great Lakes waters is a multi-program effort within the Bureau of Watershed Management and other Bureaus, such Remediation and Redevelopment. The integrated work of the scientists and engineers involved is designed to:

- Develop a consistent and holistic contaminated sediment strategy,
- Integrate contaminated sediment issues with other program efforts,
- Ensure consistency in evaluating and assessing contaminated sediment sites, and
- Ensure current and applicable technology is used in remediating sediment sites.

Key elements of the integrated effort

Key elements of the integrated effort for managing contaminated sediments include:

- Evaluation, development, and application of appropriate sediment quality assessment tools that will yield a weight-of-evidence approach to demonstrate actual or potential effects to biota including humans from contaminated sediments.
- Development of site-specific sediment quality objectives to be used with other balancing factors in making management decisions at contaminated sediment sites, applying controls on wastewater dischargers, and abating discharges from non-point sources to surface waters.
- Understanding and integrating sediment issues into various regulatory programs such as Superfund, RCRA (Resource Conservation and Recov-

To learn more go to: <http://wi.dnr.gov/org/water/wm/sed/>

ery Act), and State Environmental Repair Program sites (includes Manufactured Gas Plant Sites) and other programs including Great Lakes Remedial Action Plans.

- Maintaining a statewide sediment data base from all sediment related sampling projects.
- Developing, maintaining, and updating a statewide inventory of sites with contaminated sediments, floodplain soils, and wetland soils.
- Development of a site ranking and prioritization system to be used in the decision making process for selection of contaminated sediment sites for remediation based on available funding and resources.
- Investigating remedial and treatment technologies including dredging, capping, in situ and ex situ treatment, and handling and disposal of sediments.

While many sediment projects are large-scale endeavors, many smaller scale projects are ongoing throughout the state. The state has established a Contaminated Sediment Standing Team — CSST to develop guidance, provide technical guidance, and to communicate with the Regional offices pertaining to sediment management. This work includes standardization and implementation of policies, procedures and guidance for identification and inventory of sites, assessment of environmental and human health impacts, and enhancement of water quality in Wisconsin's surface waters through various remedial techniques. During 2002-2003 the CSST worked on further developing its website and refining a GIS-based data layer with the location of and information on each of the ongoing sediment projects in the state. In addition it is developing consensus-based sediment quality guidelines and assessment procedures to address contaminated sediment issues for dredging sites. In 2004, the Watershed Bureau has established a Sediments Section to take the lead on contaminated sediment issues.

Impaired Waters Program

In 1998, as required under the provisions of Section 303(d) of the Clean Water Act, the Department submitted to EPA for approval a list of surface waters considered impaired. This list of impaired waters was subsequently approved with a small number of additions. DNR's vision is that each waterbody on the 303(d) list will be validated through monitoring; restored where best management practices or other management efforts can be implemented; and the waterbody removed from the list. One of the available actions is the development of Total Maximum Daily Load (TMDL) analyses. Because many of the waters on the list are impaired by complex, multi-source problems, restoration of the waterbodies will happen over an extended period of time. Wisconsin's 1998 list of impaired waters contained 552 waters, which includes rivers, lakes and river segments, harbors and bays. For purposes of management, the waterbodies are placed into the following categories based on cause of the impairment:

- Contaminated sediment – 63 waters
- Nonpoint source dominated – 170 waters
- Point source and nonpoint source blend waters – 74 waters
- Point source dominated – 2 waters
- Physical habitat – 12 waters
- Other (or multiple) – 32 waters
- Atmospheric Deposition (mercury or other toxics) – 241 waters

Clean Up Progress - A Categorical Approach

Since 1998, Wisconsin has made progress in water quality cleanup relating to a number of these categories. For contaminated sediment waters, the Department will pursue "de-listing" the Bay Shipping Building site in Sturgeon Bay and the Fountain City Bay Boatyard in the Mississippi River due to successful contaminated sediment removal projects. In addition, removal of contaminated sediment has taken place as part of the Hayton Area Remediation Project along Jordan Creek and in Wausau along the Wisconsin River. Remediation plans have been developed for the

To see the list of 303(d) waters, go to: <http://wi.dnr.gov/org/water/wm/wqs/>

Lower Fox River and Sheboygan River.

For nonpoint source dominated waters, Spring Creek in Rock County was “de-listed” in 2003 due to a substantial improvement in the stream and fishery resulting from a small-scale priority watershed project. In addition, TMDLs have been approved for 18 other waterbodies listed for either sediment or phosphorus. Also, ongoing priority watershed project implementation has been taking place in watersheds draining to 57 waters on the 1998 impaired water list.

For point source and nonpoint source blend waters, many of the waters are receiving reduced phosphorus loads due to the requirement for phosphorus removal at municipal and industrial wastewater treatment plants under the provisions of Chapter NR 217, Wis. Adm. Code. For the nonpoint source portion of these blend situations, ongoing priority watershed project implementation has been taking place in watersheds draining to 22 waters on the 1998 impaired water list.

For the nonpoint source dominated, point source and nonpoint source blend and certain of the “other” category waters, in late 2001, Wisconsin began implementing the Conservation Reserve Enhancement Program (CREP). CREP is targeted towards establishing vegetated, riparian “buffers” along more than 95% of the impaired waters in these categories.

Progress in the other categories is limited. For the point source dominated waters, it appears that the impairments are likely due to past discharges and current discharges are not causing further degradation of the receiving waters. For the physical habitat category, removal of three dams on the Baraboo River will result in that segment of water being “de-listed” in the future. For waters with fish consumption advisories resulting from atmospheric deposition of mercury, progress will depend largely on reduction in air emissions of mercury both in Wisconsin and outside of the state. The Department is working with the Environmental Council of States and EPA and others to identify the best approach to address air emissions causing water impairments.



TMDL Monitoring and Modeling

Technical guidance for developing a total maximum daily load (TMDL) allocation has been developed based on a three-tiered approach: simple, intermediate and complex. Monitoring methods have been identified to provide a basic framework to assist staff in developing an integrated approach for TMDL development and work planning. Monitoring options were developed based upon staff experience working on these types of projects; however, each situation requires independent evaluation and adjustment based on site-specific conditions. The WDNR's TMDL Monitoring and Modeling Technical Guidance Document (2001) identifies pollutants to be monitored, sample collection, duration and frequency. The document also identifies suggested station locations for monitoring based on the type of model used and other factors. Model selection is also based on this tiered approach. Project specific issues to be considered in determining the appropriate resource level of monitoring and modeling would include:

- Regulatory implications for dischargers.
- Input from interested stakeholders.
- Financial and work load resources.
- Accuracy needs.
- Knowledge and types of pollutant sources.
- Size of the water body/watershed.

Cost Benefit Assessment

The Clean Water Act requires states to report to Congress on the social costs and benefits of actions necessary to achieve the objectives of the Clean Water Act. WDNR believes that while cost benefit assessments can inform the decision making process, this type of analysis should not override the goals of environmental or ecosystem health as a single dominant decision point.

The complex and multi-jurisdictional nature of environmental protection and water quality regulation and restoration precludes a precise analysis of fiscal outlays in the context of this biannual report. In addition, rapid change in our understanding of the complexity of environmental systems - for example - as well as evolving knowledge of precise endpoints for environmental damage exerted by a single contaminant further complicate our ability to assess potential benefits of specific actions or regulations. Thus, this section of the report assessment is limited to a brief discussion of some of the major financial outlays related to water quality, including the Environmental Improvement Fund (with special emphasis on the Clean Water Fund and the Safe Drinking Water Program), the state's Stewardship Program (Land Acquisitions and Easements) and the state's Polluted Runoff Management Program.

Environmental Improvement Fund

Wisconsin's Environmental Improvement Fund (EIF) consists of three separate financial assistance programs: the Clean Water Fund Program for wastewater treatment and urban runoff projects, the Safe Drinking Water Loan Program for drinking water projects, and the Land Recycling Loan Program for brownfields projects. The EIF directs limited financial resources to projects with the highest environmental priority score.

The EIF is an excellent tool for Wisconsin in meeting its responsibilities under the 1987 Clean Water Act. EIF programs provide financial assistance to local units of government in the form of subsidized loans and, in some cases, grants or interest subsidy payments.



Clean Water Fund Program

The Clean Water Fund Program (CWFP) is Wisconsin's revolving loan program. The CWFP uses funding from the capitalization grant authorized by the Clean Water Act and supplemental funding from state borrowing to help achieve state water quality goals and the objectives under the Clean Water Act.

Repayments of principal and interest from CWFP loans will make up the primary source of funding for future EIF programs. The programs are administered jointly by WDNR and the Department of Administration. The CWFP provides financial assistance to municipalities for planning, design and construction of surface water and groundwater pollution abatement facilities. Over the years an increased emphasis has been placed on preventive maintenance for existing pollution abatement facilities. Financial assistance is administered by the CWFP through: 1) a federal revolving loan program, 2) a state leveraged loan program, 3) a state direct loan and hardship program, 4) a federal hardship program, and 5) a small loan program. The state programs are a commitment made by the Legislature to exceed the federal funding for surface water pollution abatement.

From 1991 through 2003, the CWFP entered into 532 financial assistance agreements with Wisconsin municipalities totaling \$1.88 billion in loans and \$115 million in financial hardship assistance grants. In addition, the CWFP has executed agreements with 48 municipalities to subsidize interest payments on wastewater treatment project loans made to the municipalities by a state program other than the CWFP. The amount of financial assistance provided for individual CWFP projects ranges from \$25,000 to over \$134 million. The Milwaukee Metropolitan Sewerage District,

which is comprised of 28 individual municipalities serving a population of about 1.2 million, has received 49 CWFP loans totaling over \$566 million. This amount represents 30% of the CWFP's total loan dollar volume since the program began in 1991.

The CWFP provides financial assistance for the following types of projects:

- Compliance maintenance projects – These wastewater projects are necessary to prevent a municipality from exceeding effluent limitations contained in their Wisconsin Pollution Discharge Elimination System (WPDES) permit.
- New or changed limits projects – These wastewater projects are necessary for a municipality to meet effluent limitations contained in its WPDES permit which were newly established or modified after May 17, 1988.
- Unsewered projects – These wastewater projects provide treatment facilities and sewers for unsewered or partially unsewered municipalities.
- Urban runoff projects – These stormwater/nonpoint source projects are necessary to meet WPDES permit requirements, meet non-agricultural performance standards, or control urban stormwater problems under WDNR-approved plans.

The CWFP may provide financial assistance to municipalities in the following ways: provide loans at or below market interest rates, provide grants under a state or federal hardship assistance program, purchase or refinance the debt obligations of municipalities incurred for CWFP-eligible water pollution control projects, and make subsidy payments to municipalities to reduce interest on loans made by the Board of Commissioners of Public Lands for CWFP-eligible projects.

Each project is prioritized using a system established by Wisconsin Administrative Code. The environmental criteria used to select projects include: impacts to human health, maintenance of fish and aquatic life, maintenance of wildlife, impacts to outstanding and exceptional resource waters, the ability to treat septage and leachate, and the population served by the project. The priority system assigns a score to every project based on the criteria. Projects are ranked numerically, so in the event funding is not available for all requested projects in a given year, awards will be made by the order in which they are ranked. Funding each biennium has been sufficient to fund all eligible CWFP projects, except for those projects requested under the financial hardship assistance program.

Safe Drinking Water Loan Program

The Safe Drinking Water Loan Program (SDWLP) was enacted in 1997 to provide financial assistance to municipalities for the planning, design, construction or modification of public water systems. To be eligible for SDWLP funding, projects must comply with national primary drinking water regulations under the Federal Safe Drinking Water Act or otherwise significantly further the health protection objectives of the Act. The SDWLP began providing assistance in 1998. From the beginning of the program through 2003, the SDWLP has provided 31 loans to local units of government totaling \$99.4 million.

Land Acquisitions and Easements

WDNR Bureaus of Facilities and Lands and Community Financial Assistance manage the Stewardship Program, which provides funding for a variety of fee simple and easement acquisitions that protect natural resources and increase public recreational opportunities. Typical projects include preserving green space and incorporating proper land management practices; expansion of wildlife management areas, fisheries areas, natural areas, and state parks; recreational development projects; and habitat restoration areas. Where possible, the WDNR looks for opportunities to blend funds from the Stewardship Program with funds from other federal programs such as the Land and Water Conservation fund (LAWCON).

This funding, \$46 million dollars a year through the year 2010, is to provide for both land acquisition and property development. Portions are to be used by non-profit conservation organizations and local governments, both for acquisition and property development purposes. Examples of projects funded by Stewardship in the past several years include establishment of the Peshtigo River State Forest, Capitol Springs State Park, and the Lower Chippewa River State Natural Area. In addition,

substantial expansions to several water-based properties have occurred including the Turtle Flambeau Scenic Waters Area and Tomahawk River State Natural Area. WDNR looks for opportunities to partner with other organizations or to cost-share project costs with federal dollars available for acquisition of lands protecting wildlife, fishery or water quality.

Two of the five acquisition priorities for Stewardship funding are lands that preserve or enhance the state's water resources. This includes land along the Lower Wisconsin State Riverway; land abutting wild rivers and wild lakes, and land along the shores of the Great Lakes. In addition, the Stewardship program focuses on efforts to protect water quality and fishery habitat by acquiring buffer areas along streams. This program provides funding for WDNR projects and provides cost sharing to municipalities and nonprofit organizations. Since 1990, approximately \$10 million has been spent on WDNR streambank projects, and about \$4.5 million in grants have been provided to municipalities and nonprofit organizations for 45 projects. The WDNR has targeted 146 stream corridors with a goal of 21,075 acres or 1,317 miles for easements and 19 stream corridors totalling approximately 30,334 acres or 130 miles for acquisitions.

In addition to the Stewardship Program, the Nonpoint Source Pollution Abatement Program provides funding for WDNR easements to reduce polluted runoff. This program has funded approximately \$3.3 million for purchase of 61 easements totaling 1,400 acres. Management of properties owned by the WDNR is outlined in master plans for each property. These plans cover maintenance, management, and development that will occur on the property for at least 15 years. Contained in the plans are recommendations for a variety of land management and recreational activities, especially for those properties that include large water features that are aimed at protecting water quality and scenic natural features. Master plans for properties such as the Lower Wisconsin Riverway, Brule River State Forest, Turtle-Flambeau Flowage Scenic Waters Area, Chippewa Flowage, and Dells of the Wisconsin River State Natural Area contain provisions for protection of water quality and scenic beauty.

Polluted Runoff Management Program

Priority Watershed/Lake Program

Expenditures for polluted runoff including pass through funding to communities via the Priority Watershed/Lake Program, open competition grants through the Targeted Runoff Management (TRM) Grant Program, and Urban Nonpoint Source and Storm Water Grant Program. Financing compliance with performance standards (described above under "polluted runoff"), has a total estimated annualized cost of \$92 million. The estimated portion for state government is \$22 million (24%), for local government is \$46 million (50%) and for private landowners and operators is \$24 million (26%). The majority of the local government and private sector costs are associated with meeting the non-agricultural performance standards. Sources of government funds include state bonding, segregated and general purpose revenue sources for cost-sharing and local staff, the state clean water revolving loan fund, federal programs, including EQIP, CRP, CREP and section 319, and local funding sources, including county cost-share programs and storm water utilities. These funds are needed to meet standards across the state, including the 120 waters listed as impaired on the federal section 303(d) list.

Special State Concerns and Recommendations

Wisconsin has identified key priorities around which the Water Division, particularly the Watershed Bureau, will work in the coming years. The special state concerns described below outline the topical area, issues involved and key priority objectives for the Department and partners for the coming reporting period.

Great Lakes

The Great Lakes bound the eastern and northern borders of Wisconsin. With the islands of Door County and the Apostle Islands, there are over 1000 miles of Great Lakes shoreline. With over half of the state's population living in the basin, the Great Lakes are critical as source of drinking water, industrial and commercial process and cooling water, a significant transportation system and a highly desirable tourist destination for fishing, boating or the beaches. As interstate and international waters, management programs must be established at a regional scale to be effective.

In 2004, the Department elevated the status of Great Lakes issues by creating an Office of the Great Lakes. This office works closely with DNR's administration to support Wisconsin's Governor in his chairing of the Council of Great Lakes Governors. The Council is developing a regional agenda in response to a Congressional inquiry that focuses on 9 priority areas:



- ensuring the sustainable use of Great Lake waters
- protection of public health from adverse impacts of pollution
- controlling pollution from diffuse sources
- continue to reduce the introduction of bioaccumulative substances into the ecosystem
- stop the introduction and spread of non-native invasive aquatic species
- enhance fish and wildlife by protecting and restoring important habitats
- restore the environmental quality in Areas of Concern
- standardize and enhance methods for data collection, analysis and distribution
- adopt sustainable use practices to protect environmental resources and enhance the recreational and commercial values of the Great Lakes.

Using this agenda, Wisconsin will be working in partnership with other states to carry out specific actions to eliminate the need for fish and wildlife consumption advisories through remediation of contaminated sediment, atmospheric pollutant controls, nonpoint source reductions. Important habitat areas will be identified and protected or restored in those cases where habitat quality may be impaired. Plans to stop exotic species will be implemented with an emphasis on preventing new introductions from any sources. Sources of pollution which lead to beach closure will be identified and corrected. Through this agenda, the Great Lakes state Governors will seek federal support for a multi-year campaign to restore the quality of the Great Lakes ecosystem.

Because of their immense size, management actions will require extensive collaboration and cooperation among jurisdictions and among all levels of government, advocacy interests and industry. These are large-scale problems which need multi-year efforts. With 20 percent of the world's supply of freshwater at stake, increasing the prominence and national investments into the Great Lakes restoration projects are necessary and reasonable actions.

Aquatic Invasive Species

Since the early 1800s, more than 140 aquatic nonindigenous species (ANS) have arrived in the Great Lakes. Not all arrivals – or introductions – have resulted in harm. However, some threaten the diversity or abundance of native species, the ecological stability of habitats, and/or commercial,

agriculture, aquaculture and recreation activities. The pace of introductions is increasing and it will only get worse with increasing global trade unless national/international prevention and control measures can be put in place.

In 2002, WDNR completed a Comprehensive Management Plan to Prevent Further Introductions and to Control Existing Populations of Nonindigenous Aquatic Nuisance Species (ANS). This plan is a blueprint for managing aquatic invasive species and is designed to help prevent new introductions, to slow the spread of existing ANS and to control or abate the ecological and economic impact of existing problem species. water, for example, likely involve and affect the other - surface water.

This plan was prepared in partnership with the University of Wisconsin Sea Grant Institute and in 2002 was submitted to the National Aquatic Nuisance Species Task Force, when it was approved.

The invasives program recognizes the need for regional, national and international action and coordination in targeting ballast water of ocean going vessels — the primary, documented way many invasive species reach the Great Lakes. Also, the Comprehensive Plan calls for a coordinated study of the potential for introductions by the bait and aquaculture industry and development of recommendations to reduce this pathway for importation of aquatic exotics. Many aquatic activities can result in the transport of invasive species and their introduction into uninfested waters, but the bait shops, pet pet sales, and aquaculture operations are a much lesser threat than ballast water represents.



The primary way invasive species spread to new inland waters is by hitching a ride aboard the boats, trailers, bait buckets and other equipment of recreational boaters and anglers. Inspections of recreational boats at key public landings and an expanded information and education campaign and outreach efforts to slow the advance of zebra mussels and Eurasian watermilfoil are also recommended.

During 2002-04, the state has begun developing a coordinated, comprehensive program for aquatic invasives modeled after the state of Minnesota's. Key program elements include prevention, control and abatement through watercraft inspection at boat landings, enforcement efforts, and a stepped up public awareness campaign that includes television and radio messages to reach a large audience. An integrated data system to support this work is also being developed. Minnesota's program has been credited with greatly slowing the spread of invasive species – in particular, Eurasian water milfoil. Results from recent boater surveys have shown that Minnesota has been effective in getting the message out to boaters by slowing the spread of Eurasian Water Milfoil in inland waters by more than 50%.

Water Quantity Issues

Wisconsin is known for its abundant water resources. However, there is a growing concern about the availability of enough high quality water for uses ranging from public water supply to sustaining cold water habitat for fish. Wisconsin's surface water and groundwater quantity concerns, while seemingly distinct, are as closely linked as the resources. Studies throughout the state illustrate the direct connection between shallow aquifers and the state's streams, rivers, lakes and wetlands. Thus, in general, water quantity concerns with one aspect of the resource — groundwater, for example, likely involve and affect the other - surface water.

Groundwater availability in a given area is limited by geologic and hydrologic factors. Over the years the state's increasing population, rapid widespread development and increasing and varied industrial demands in some areas have increased demands for groundwater beyond the amount that can be sustained. This imbalance can result in cumulative water quantity and related water quality problems. Significant regional groundwater quantity impacts are documented in the Lower Fox Valley, and Southeastern Wisconsin and are beginning to be seen in Dane County. These three areas are experiencing substantial groundwater level declines. Localized surface expressions of quantity issues include lake level drops, stream flow declines, wetland size and level declines, and the disappearance of springs. In addition these declines have contributed to drinking water quality problems in the Lower Fox Valley and Southeastern Wisconsin.

Historically, management of Wisconsin's groundwater and surface water has been functionally distinct. The State's regulations for water use cover installation of high capacity wells, surface water

diversions, in-stream flows and water conservation. The recent evaluation of placement of a high capacity well for a drinking water bottling plant in a spring-fed region illustrated the complexity of social, ecological and institutional issues involved and underscored the state's limited powers to protect sensitive water bodies, such as springs, from the impacts of high capacity wells. In Spring 2004, the state has taken an important step towards integrated management of water resources by passing groundwater quantity legislation designed to further protect groundwater and surface waters from the impacts of high capacity wells. Specifically, the law expands the DNR's authority to regulate high capacity wells that may impact certain critical surface water resources. The law also designates two large regional groundwater management areas for which a coordinated water management strategy is needed to alleviate pressures of increasing water demands and creates a Groundwater Advisory Committee to make recommendations on management strategies in these regions.



In addition, increasing interest in and demand for water diversions involving the Great Lakes Basin also mandate a coordinated programmatic response. Most recently, Wisconsin has been participating on a binational committee to oversee implementation of Annex 2001 to the 1985 Great Lakes Charter. The Great Lakes Charter and the Great Lakes Charter Annex are voluntary agreements through which the Great Lakes states and provinces cooperatively manage the waters of the Great Lakes. In the Annex, the Governors and Premiers outline the framework for a set of binding agreements among the Great Lakes States and Provinces and establish a series of principles for a new standard for reviewing proposed withdrawals of Great Lakes water.

Riparian Development

Few natural scenes are more treasured than a golden sunrise over a mist-covered lake. Perhaps it is the sense peace this scene provides that, ironically, has resulted in the tremendous changes in the state's shoreland areas. The sense that many, if not most, of the state's lakes and increasingly its riparian shore areas were fully or nearly completely developed prompted the WDNR to initiate its Northern Initiative in the early 1990s. Surveys in 1994 and 1995 indicated that residents and visitors were very concerned about retaining northern Wisconsin's wild and scenic qualities. Follow-up surveys of land use change in the northern part of the state confirmed suspicions that undeveloped riparian areas were being lost at a rapid rate. Generally, land cover data and land use analyses show extraordinarily rapid growth throughout the entire state. Development pockets are occurring in the Milwaukee to Madison corridor, the Fox Valley/Green Bay area, the Hudson/Eau Claire/Chippewa Falls region (tributary to the Twin Cities) and a generalized growth pattern stretching across the entire northern portion of the state. Within each of these areas and beyond, land values for shorelands have escalated while the same land parcel becomes even more critical (as it becomes more rare) for its ecological functions. Several initiatives, at the federal, state and local levels, are ongoing to address the issue of land use generally - and riparian development specifically - including:

- The Northern Initiative (WDNR), a geographically-based framework for focusing interest and resources on preserving the fundamental values of wild places in the north;
- Land Legacy (WDNR), a proposed 50-year land acquisition framework for public land purchase and easement development in the state;
- Conservation Reserve and Enhancement Program (Federal), a federal match program to secure buffers through easement and acquisition;
- Smart Growth (Local), a series of state level requirements for comprehensive planning and the local level which involves identifying key natural resource features in a community. This may result in some type of local protection for key riparian resources.
- Shoreland Management Program (State/Local). In the 1960s Wisconsin established an administrative code known as "NR 115" to protect water quality, wildlife habitat and natural shoreline beauty through statewide minimum standards for land uses and development adjacent to lakes, rivers and streams in unincorporated areas. NR 115 was implemented via mandated county shoreland ordinances. NR117 is a similar provision applying to shoreland-wetlands in incorporated areas. NR118 covers shoreland management associated with the Lower





St. Croix Riverway.

- Lakes Planning, Protection and Classification Grants (State/Local) have provided funds for careful resource planning and protection at the local level, resulting in initiatives designed to meet the resource protection needs of lakes based on waterbody characteristics and development potential.
- Rivers Planning and Protection Grants (State/Local) have provided funds to protect rivers through resource planning at the local level to help prevent water quality, fisheries habitat, and natural scenic beauty from deteriorating as residential, recreational, industrial and other uses increased along rivers.

Issues

While Wisconsin's Shoreland Management Program was landmark legislation in the 1960's, it has not kept current with development trends or the impacts of the resulting development.

Studies have shown that the current minimum standards may be inadequate to prevent water pollution, shoreline erosion and the loss of fish and wildlife habitat. The Department has updated Ch. NR 115, Wis. Admin. Code, to offer landowner more flexibility in developing and maintaining shoreland property, while offsetting the impacts of shoreland development and increasing environmental protection.

Many local communities have adopted local land use policies that exceed the state minimum standards recognizing the need to protect Wisconsin's resources, however, turnover is often high in local government. As a result there is a continuous need to provide education and training to local governments.

Private property rights groups are becoming more active in the State, and many local communities are turning to the Department for help in understanding the legal implication of proposed regulations, as well as implications of State and Federal Supreme Court cases. Concerns range from regulation and takings to when can a variance be issued. Education and training is needed for local Corporation Counsels, as well for the general public.

Land prices have skyrocketed surrounding Wisconsin lakes and rivers. One result is that it is more expensive to preserve the remaining undeveloped land, and the State is often at odds with developers for the same piece of land. The other problem is more and more people are turning to "marginal" pieces of property to develop, often with large areas of wetlands that are difficult to develop and often, the landowners have unrealistic expectations of how the property can be managed.

Contaminated Sediment

Contaminated sediment is by no means a new issue to the state of Wisconsin — the state has been working in partnership with public and private entities for many years to identify, understand and remove contaminated sediment. Today, however, the state is redoubling its efforts to remediate contaminated sediment as this issue has been identified as a priority for the Water Division. Showcasing the latest technology and partnership approaches is the Fox River Sediment Remediation. As one of the Governor's top environmental program priorities, the Fox River work is spurring momentum for a much broader effort — the development and implementation of a contaminated sediment strategy for the state.



This Department's cross-program approach to this complex environmental hazard will be lead by the Sediment Management Section within the Bureau of Watershed Management in coordination with the Department's Contaminated Sediment Standing Team. This team has inventoried all known sites through the state and maintains a log that reflects each site's status from 1) site identification 2) site assessment 3) remediation planning 4) implementation to 5) post-remedial monitoring. These data and tools provide a framework for developing a more comprehensive approach to managing, monitoring and remediating contaminated sediment statewide. In the coming year, available resources will be engaged to further develop and implement this broad strategy for realizing concrete environmental restoration.

Habitat Protection and Restoration

Habitat issues have become increasingly important in water resource management due to the connection with water quality and quantity in both surface water and groundwater. Many of the restoration goals for streams are imbedded in developing a better understanding of regional hydrology and the impacts of land cover and land use types as they relate to these flow patterns. While programs like the Conservation Reserve Program buffers and Conservation Research and Enhancement Program buffers and filter strips have been established to protect zones, the design of riparian practices and the assessment of the regional hydrological patterns must occur together.

Instream habitats, or the stream morphology, are significantly affected by the speed and volume of runoff delivery. Practices designed to reduce pollutants should be assessed to promote loss of energy in these overland flows. These designs will also promote greater opportunities for recharge and support of base flows, while working to minimize both the amount of fluctuations and duration of peak to average flow variations. These land practices to support attainment of in-stream habitat goals will also result in increases in habitat quality and amounts for wildlife needing riparian areas for survival.

Thus, there is a need for an equivalent program of some kind to support continuous sign-up for buffers and filter strips in non-agricultural areas. Further, regional and local, where possible, hydrologic modeling should be encouraged during the design of large developments, and all practical steps should be taken to encourage infiltration and preservation not only of pre-development flow patterns, but of water quality as well.

During development of the state's "Smart Growth" network, DNR is creating shared datasets and governmental outreach to support communities in their identification of sensitive resources so that protection can take place locally through planning, ordinances, and public awareness.

Mercury

Mercury is critical pollutant of concern for Wisconsin waters. Emissions of mercury from fossil fuel-fired boilers, which are used to generate electricity, and from other major sources significantly contribute to mercury entering waterbodies and ultimately fish and wildlife. During the past few years, Wisconsin has continued to study the biogeochemistry and ecological movement of mercury, while simultaneously developing strategic initiatives to stem its influx into the environment through regulatory and nonregulatory controls.

The WDNR Air Program assembled a Mercury Analysis Team to address the problem of mercury in the environment through the development of a strategic initiative involving non-regulatory and regulatory tools. The Mercury Analysis Team is charged with developing an atmospheric mercury modeling system for Wisconsin and the Great Lakes region. This process includes conducting a comprehensive analysis of the emission, transport, transformation, and deposition of mercury to land and water surfaces in the region. The modeling system was peer reviewed and should be available soon to support development and evaluation of the effectiveness of mercury emission reduction initiatives and strategies. These initiatives and strategies include atmospheric mercury TMDLs (Total Maximum Daily Loads) for impaired water bodies, proposed state regulations for the reduction of mercury from fossil fuel-fired utility plants, and other volunteer mercury reduction programs.

Monitoring and Data Management

Effective water management demands knowledge of resource quality conditions. Without such information, management actions may or may not be effectively applied, prioritization of work may be misguided at best – arbitrary at worst, and ecological evaluation of project effectiveness is impossible. Monitoring and associated management of data, however, is both “behind the scenes” and expensive, so that garnering a constituency for support is difficult. Further, in the area of data management, the pace of change and the availability of new systems result in rapid technology turnover – which can inhibit investment in new data initiatives. While these problems have been somewhat overcome in some areas of water management in Wisconsin, in other areas they persist and result in loss of efficiencies from lack of communication, data availability and accessibility. These problems are exacerbated by severe budget cuts in this routinely under-funded area of work. Despite these problems, Wisconsin is making progress in several areas of surface water monitoring and database development and management including:



Accomplishments

- Developing and implementing standardized protocols for baseline monitoring for Wadeable and nonwadeable streams, lakes and wetlands;
- Monitoring biological, habitat and physical aspects of waterbody systems to understand ecological conditions;
- Implementing a random stratified sample design for Wadeable streams;
- Continuing long-term trend monitoring on large river systems;
- Identifying key stations where flow gages are needed to conduct TMDL modeling and floodplain management;
- Developing a state-of-the-art web-interactive biological and habitat database for surface water data;
- Upgrading the state's 305b assessment database (WADRS) into a web-interactive tabular and spatial system linked to the state's 1:24,000 hydrography layer;
- Upgrading and deploying the state's water inventory, the Register of Waterbodies, with a spatial/mapping interface to better identify waterbody identification numbers and to QA/QC attribute data associated with the system (name, size, etc.);
- Making water-related data available in a web-mapping application (WT Webviewer) to enhance staff access to integrated environmental data for better and faster decision making.
- Expanding datasets linked to the Surface Water Inventory System (SWIS) including general permit data in SER to demonstrate integrated data queries for assessing cumulative impacts.

Work Yet to Accomplish

- Development of an inter-program monitoring strategy that encompasses baseline monitoring components and specialized monitoring for program specific data including TMDLs, sediment remediation, 303(d) list validation, permit compliance, etc.;
- Obtain sufficient funding to fully implement the state's baseline and program-specific monitoring;
- Obtain funding sufficient to maintain required data systems and to manage data for program management, (ie., Nonpoint Source Performance Standards);
- Evaluate and modify the state's use designation assessment procedures in light of major changes in NR102, the state's water quality classification code;
- Fully implement the WADRS (Assessment System), enter and QA/QC all data the 2005 for Consolidated Assessment and Listing Methodology (CALM) submittal;
- Link key databases (baseline data; 303(d) waters, outstanding and exceptional resource waters, aquatic invasives, outfalls, assessment data from WADRS, and STORET data through the Surface Water Integration (SWIS) system;
- Progress in developing and implementing a long-term strategic perspective for the state's water and water-related databases.

Implementing the Nonpoint Source Performance Standards

Implementing the state's new Nonpoint Source Performance Standards is a high priority for the Water Program. On October 1, 2002 the state promulgated nonpoint source performance standards and prohibitions for agricultural and urban runoff as part of the redesign of the state's nonpoint source pollution control program. Agricultural performance standards cover sheet and rill erosion, manure storage facilities, clean water diversions and nutrient management. Agricultural prohibitions restrict overflows from manure storage facilities, unconfined manure piles, direct runoff from feedlots and stored manure and unlimited livestock access to state waters. Non-agricultural (urban) and transportation facility performance standards cover construction site erosion, post-construction storm water runoff and runoff from developed areas. Creating and implementing an intergovernmental framework to ensure full implementation of these standards is critical to realizing the intent of the legislation - achieving and protecting water quality standards.

Compliance Assistance for Permitted Facilities

Compliance assistance is any activity designed to: 1) help a permittee comply with all permit program requirements; 2) help the permittee understand their responsibility in complying with a permit; and 3) help the permittee stay in compliance with the terms and conditions of a permit. Compliance assistance is usually not provided when a permittee is violating a permit and an enforcement action is underway.

WDNR has had a long-standing emphasis on compliance assistance as a primary function for program staff. Many of WDNR's WPDES resources are located in field offices across the state to enhance the access permittees have with agency staff and to create a "field presence" whereby permittees understand the role of the WDNR regulator in assuring state waters remain clean. As the Department moves toward the regulation of new, non-traditional sources of pollution such as stormwater, the need for compliance assistance will increase significantly. The generally high rate of compliance that permittees in Wisconsin have is, in part, a measure of the success of compliance assistance.

Compliance assistance for municipal and industrial wastewater systems includes the following activities:

- Providing technical assistance for treatment plant operators on system operations and maintenance.
- Assisting permittees in understanding and implementing all terms and conditions of the permit.
- Providing advice to permittees on appropriate actions necessary to assure compliance with permit terms and conditions.
- Reviewing reports and plans for wastewater treatment and disposal systems and providing approvals, comments and advice, as appropriate.
- Providing training to permittees and operators on new regulatory requirements.
- Providing feedback to permittees during and following inspections and other facility evaluations by identifying minor non-compliance and recommending actions to prevent more significant permit violations.

Compliance assistance for new permittees or new categories of permittees is especially important to assure that such dischargers understand not just the terms and conditions of the permit, but also the broader implications associated with holding a permit. This is especially important for permit coverage for CAFOs and stormwater sources that have traditionally not been regulated under state or federal regulations. Guiding these new permittees through the regulatory process and making available to them the resources needed to attain and maintain compliance is an important proactive step in assuring water quality protection. In many instances, this involves training sessions for groups of permittees to assure that all aspects of the permitting process are followed.

We recommend that compliance assistance be recognized as a basic and important part of the WPDES program. Enforcement actions are appropriate and necessary when compliance assistance does not address or is not adequate to assure long-term compliance with state and federal clean water laws.